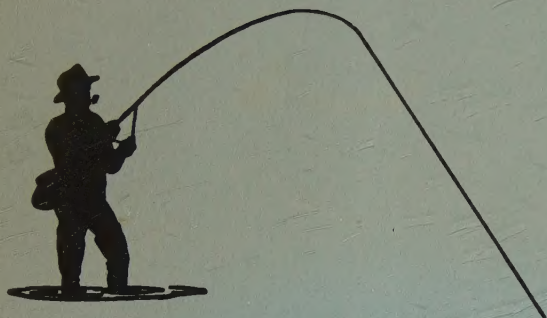


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SPORT FISHERY ABSTRACTS

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FISH AND WILDLIFE SERVICE



SPORT FISHERY ABSTRACTS

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Sport Fishery Abstracts is intended to furnish fishery biologists with abstracts of current literature in sport fishery research and management.

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SPORT FISHERY ABSTRACTS

An abstracting service for fishery research and management

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AQUATIC PLANTS AND THEIR CONTROL

81-002444 Marsot, P.; R. Fournier and C. Blais. CULTURE À DIALYSE: EMPLOI DE FIBRES CREUSES DIALYSANTES POUR LA CULTURE MASSIVE DE PHYTOPLANKTON. [DIALYSIS CULTURE: USE OF HOLLOW DIALYSIS FIBERS FOR MASSIVE CULTURE OF PHYTOPLANKTON.] *Can. J. Fish. Aquatic Sci.* 38(8):905-911. Aug. 1981. In French with English summ. SFA 26(4)
[INRS-Oceanol., 310 Ursulines, Rimouski, PQ G5L 3A1, Canada]

81-002445 Neronovskaya, I. T. ON THE RESULTS AND PROSPECTS OF THE INTRODUCTION OF PHYTOPHAGOUS FISHES INTO WATERS OF THE USSR. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):101-111. 1980. SFA 26(4)
[GosNIROKh, Leningrad, USSR]

GENERAL FISH CULTURE

81-002446 Hansen, L.; P. L. Montreuil and J. D. Dutil. A SURVEY OF AQUACULTURE ENTERPRISES OF QUEBEC IN 1978. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 967. 98p. Sept. 1980. In English with French summ. SFA 26(4)
[Fish. Res. Br., 901 Cap Diamant, P.O. Box 15500, Quebec, PQ G1K 7Y7, Canada]

81-002447 Ostergaard, D. E. USE OF MONOFILAMENT FISHING LINE AS A GULL CONTROL. *Prog. Fish-Cult.* 43(3):134. July 1981. SFA 26(4)
[U.S. Fish Wildl. Serv., Allegheny Natl. Fish Hatchery, Warren, PA 16365]

81-002448 U.S. Fish and Wildlife Service. PROPAGATION AND DISTRIBUTION OF FISHES FROM NATIONAL FISH HATCHERIES FOR FISCAL YEAR 1980. *U.S. Fish Wildl. Serv. Fish Dist. Rep.* 15. 74p. 1981. SFA 26(4)
[Washington, DC 20240]

TROUT AND SALMON CULTURE

81-002449 Berg, E. R. MANAGEMENT OF PACIFIC OCEAN SALMON RANCHING: A PROBLEM OF FEDERALISM IN THE COASTAL ZONE. *Coastal Zone Manage. J.* 9(1):41-76. 1981. SFA 26(4)
[Northwestern Sch. Law, Lewis and Clark Coll., Portland, OR] This article describes the ocean salmon ranching industry that has recently developed in Oregon and its attendant controversies, for the purpose of showing the need to replace the present regime of regulation by individual states with a comprehensive federal management system. Critical inadequacies of leaving the industry to regulation by individual states are discussed, as are relevant legal doctrines and existing federal statutes.

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TROUT AND SALMON CULTURE (CONTINUED)

81-002450 Bergot, P.; J. M. Blanc; A. M. Escaffre and H. Poisson. EFFECT OF SELECTING SIRES ACCORDING TO THEIR NUMBER OF PYLORIC CAECA UPON THE GROWTH OF OFFSPRING IN RAINBOW TROUT (*SALMO GAIARDNERI* RICHARDSON).

[Lab. Nutr. Poissons, Inst. Natl. Rech. Agron., Cent. Rech. Hydrobiol., Saint Pée sur Nivelle, 64310 Ascaïn, France] Two sires were selected, from each of four full-sib families, according to high ("sup") and low ("inf") caeca number. Pyloric caeca number, precocity and growth of offspring were studied in a factorial breeding plan of these eight sires crossbred with three dams. Compared with the progeny of sires "inf", the progeny of sires "sup" exhibited (a) a higher caeca number, (b) slightly more precocious development (as shown by beginning of hatching, first feeding and degree of hydration during yolk resorption) and (c) a higher growth rate. Significant correlations were found, within dams, between fish length at 239 days and caeca number both within and between families of offspring. Although the physiological links between caeca number and growth are still obscure, the possibility of improving growth performance in rainbow trout by indirect selection on caeca number is discussed.

81-002451 Fagerlund, U. H. M.; J. R. McBride and E. T. Stone. STRESS-RELATED EFFECTS OF HATCHERY REARING DENSITY ON COHO SALMON. *Trans. Am. Fish. Soc.* 110(5):644-649. Sept. 1981. SFA 26(4)

[Dep. Fish. Oceans, West Vancouver, BC V7V 1N6, Canada]

81-002452 Legerski, J. THE HYBRIDIZATION OF MACKINAW TROUT WITH BROWN TROUT AT THE STORY HATCHERY. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:58. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. Abstract only. SFA 26(4)

[Box 481, Story, WY 82842] Each fall the Story Hatchery spawns its brood stock of Mackinaw trout (*Salvelinus namaycush*) to fulfill its egg requirements for state and federal hatcheries. During the fall of 1976, extra Mackinaw eggs were available and an experimental hybrid was attempted with the brown trout (*Salmo trutta*). "Lochinaw" was the name adopted by the hatchery personnel for this hybrid. Six female Mackinaw fertilized with four male brown trout produced 26,100 Lochinaw eggs. The eggs were in the incubator for eight weeks at which time 71% of the eggs were eyed. Eggs were placed in hatching baskets and hatched by February 10, 1977. Nearly all the fry had blue sac and only 30 were saved. By December 23, 1977 only 16 fish remained. In the last three years the number has declined to 12 fish at the end of 1978, 10 fish at the end of 1979 and 9 fish at the end of 1980. The fish that remain seem to be doing well and are growing at a respectable rate.

81-002453 Sutterlin, A. M.; E. B. Henderson; S. P. Merrrill; R. L. Saunders and A. A. MacKay. SALMONID REARING TRIALS AT DEER ISLAND, NEW BRUNSWICK, WITH SOME PROJECTIONS ON ECONOMIC VIABILITY. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1011. iv + 28p. Apr. 1981. In English with French summ. SFA 26(4)

[Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

WARMWATER CULTURE

81-002454 Castagnolli, N. and E. M. Donaldson. INDUCED OVULATION AND REARING OF THE PACU (*COLOSSOMA MITREI*). *Aquaculture* 25(2-3):275-279. Aug. 1981. SFA 26(4)

[Sao Paulo State Fish. Inst., Av. Francesco Matarazzo-455, (D1050), Sao Paulo (S.P.), Brazil] A method is described for spawning the economically important Brazilian characin species *Colossoma mitrei*. Ovulation was induced using a priming injection of 0.2 mg/kg partially purified gonadotropin SG-G100 followed at 8h by injecting an extract of 20mg/kg acetone-dried chum salmon pituitary powder. Spermiation was induced in the

WARMWATER CULTURE (CONTINUED)

81-002454 CONTINUED male using a similar primer followed by 14mg/kg acetone-dried chum salmon pituitary powder. Eggs were successfully fertilized and incubated at 25-26°C. Hatching occurred at 20.5h and a survival of 10% to fingerling size was achieved.

81-002455 Central Luzon State University. PROGRESS REPORT, FRESHWATER AQUACULTURE CENTER, CENTRAL LUZON STATE UNIVERSITY, MUÑOZ, NUEVA ECIJA. *Freshwater Aquacult.* Cent. Cent. Luzon State Univ. Tech. Rep. No. 17. v + 100p. 1980. SFA 26(4)
[Muñoz, Nueva Ecija 2320, Philippines]

81-002456 Christensen, M. S. A NOTE ON THE BREEDING AND GROWTH RATES OF THE CATFISH *CLARIAS MOSSAMBICUS* IN KENYA. *Aquaculture* 25(2-3):285-288. Aug. 1981. SFA 26(4)

[Im Trutz 35, 6000 Frankfurt Main, West Germany] Successful reproduction in captivity of catfish of the genus *Clarias* is generally restricted to the laboratory. This paper reports on a method more practically applicable to developing countries. It involves drying the pond for 7 days or more in strong sunshine and then filling the pond one week before new moon with an application per 100m² of 50 l dry cattle manure, 25 l dry soil and 25 ml phosphoric acid. At the same time, 2-3 each of gravid females and males are added. Fry have to be separated at 1½ months as males grow faster and begin feeding on females at this age. Between 5 and 11 fingerlings were obtained per m². Average weights of 698g for males and 316g for females were achieved in 170 and 171 days respectively from the egg, equivalent to productions of 3490 and 1580 kg/ha per year in two crops at the densities tested. Conversion rates ranged from 1.4 to 3.2.

81-002457 Guest, W. C. COMPARISON OF HATCHERY WATER TEMPERATURES AND OVERWINTER SURVIVAL OF TWO *MICROPTERUS* BASSES. *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 3:30-41. 1980(1981). SFA 26(4)

[Tex. Parks Wildl. Dep., Heart of the Hills Res. Stn., Ingram 78025] This study was designed to compare water temperatures and overwinter survival of adult Florida intergrades and northern largemouth bass on Lewisville and Eagle Mountain State Fish Hatcheries in Texas during the winter of 1979-80. Water temperatures on Lewisville were typically more extreme than those on Eagle Mountain and when water temperatures declined to 4 C or below, Lewisville was significantly colder. There was no significant difference in bass survival between "subspecies" or hatcheries during the 4-month study period. These results indicate that the Florida intergrades withstood short-term exposure to extremely cold temperatures as well as northern bass, but showed less increase in condition.

81-002458 Helfrich, L. A. CAGE CULTURE OF CHANNEL CATFISH AND RAINBOW TROUT IN A VIRGINIA POND. *Va. J. Sci.* 32(3):93. 1981. Abstract only. SFA 26(4)

[Dep. Fish. Wildl. Sci., VPI&SU, Blacksburg, VA 24061] To evaluate the biological feasibility of a double fishcrop rotational system in Virginia's warmwater farm ponds, channel catfish (*Ictalurus punctatus*) and rainbow trout (*Salmo gairdneri*) were reared in cages (1m³) suspended in a pond at the Reynolds Homestead Agricultural Station, Patrick County, Virginia. Channel catfish fingerlings (127mm), stocked in June at a density of 100 fish per cage (n=6 cages) were harvested in late October. During the 124 day growing season at a mean water temperature of 25°C, yield, net production, food conversion, and survival of channel catfish reared on a diet of commercial trout feed were significantly greater (P<0.05) than those fed commercial catfish feed. Rainbow trout fingerlings (127mm), stocked in November at a density of 200 fish per cage (n=2 cages) were sampled in March. After a 136 day winter growing season at a mean water temperature of 6°C, yield, net production, food conversion, and survival of rainbow trout averaged 31.0 kg, 8.6 kg, 4.50 and 94 percent per cage, respectively. The

SPORT FISHERY ABSTRACTS

WARMWATER CULTURE (CONTINUED)

81-002458 CONTINUED results indicate that double-cropping of channel catfish and rainbow trout in cages in Virginia ponds is biologically feasible. Large-sized fingerlings (>150mm) and high stocking densities (>250 fingerlings/cage) are recommended.

81-002459 Karamchandani, S. J. and D. N. Mishra. PRELIMINARY OBSERVATIONS ON THE STATUS OF SILVER CARP IN RELATION TO CATLA IN THE CULTURE FISHERY OF KULGARHI RESERVOIR. *J. Bombay Nat. Hist. Soc.* 77(2):261-269. Aug. 1980. SFA 26(4)

[Cent. Inland Fish. Res. Sub-stn., Allahabad, (U.P.), India]

81-002460 Landen, O. FLAMING GORGE KOKANEE. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:9-10. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. SFA 26(4)

[Box 168, Daniel, WY 83115]

81-002461 McDonald, L. R. A 1980 UPDATE ON YELLOWSTONE CUTTHROAT CULTURE AT THE CLARK'S FORK HATCHERY. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:11-15. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. SFA 26(4)

[Star Rt. Box 80, Belfry, MT 59008] The culture of Yellowstone cutthroat (*Salmo clarki bouvieri*) began at the Clark's Fork Hatchery in 1970. The first eggs were taken in the spring of 1973. A domestic brook stock was established in 1977 at the hatchery to allow future investigations by the management and cultural sections of the Wyoming Game and Fish Department. The total number of eggs taken has increased from 7,300 in 1974 to 296,000 in 1980. An average of 1,260 eggs were obtained from each female in 1980. The percent eye has ranged from 41.6 to 88.5. Survival of green eggs to plant was 51.8 percent. The average growth rate of Yellowstone cutthroat was 0.58 inches/mo (14.7 mm/mo). As a precautionary measure the holding capacity for these fish was 75% of what is used for other fish at this station. The establishment of the Yellowstone cutthroat brook stock at the Clark's Fork Hatchery has assured a reliable source of eggs for fishery manager's needs.

81-002462 Moores, S. B. OPTIMIZING SPAWNING PARAMETERS FOR *TILAPIA AUREA* IN THE SAN LUIS VALLEY, COLORADO. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:28-31. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 80501. SFA 26(4)

[412 N. Whitcomb, Fort Collins, CO 80521] Culture of *Tilapia aurea* (Steindachner), a warm water Cichlid native to Africa, is possible in the San Luis Valley, Colorado, due to the abundance of geothermally heated well water. Eight week trials were conducted to help determine the optimum spawning parameters for this species in circular steel tanks. Maximum spawning occurred in 5.27m² tanks with a water depth of 110 cm, brood fish density of 15 fish/m², and a sex ratio of 5:1, females to males.

81-002463 Nosatova, G. M. REARING OF BAIKAL OMUL, *COREGONUS AUTUMNALIS MIGRATORIUS*, IN LAKES OF KARELIA. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):116-120. 1980. SFA 26(4)

[SvetrybNIiproekt, Petrozavodsk, USSR]

81-002464 Opuszyński, K. COMPARISON OF THE USEFULNESS OF THE SILVER CARP AND THE BIGHEAD CARP AS ADDITIONAL FISH IN CARP PONDS. *Aquaculture* 25(2-3):223-233. Aug. 1981. SFA 26(4)

SPORT FISHERY ABSTRACTS

WARMWATER CULTURE (CONTINUED)

81-002464 CONTINUED

[Dep. Pond Manage., Inland Fish. Inst., Zabieniec near Warsaw, 05-500 Piaseczno, Poland] On the basis of fishery results and food analyses of the silver carp, *Hypophthalmichthys molitrix*, and of the bighead carp, *Aristichthys nobilis*, it was found that the latter species is less useful for intensive rearing in ponds jointly with the common carp. Although the bighead carp, due to its rapid growth rate, gave a higher level of production than silver carp at the same stocking densities, the drop in common carp production with bighead was so considerable that there are doubts as to the usefulness of joint rearing of the two species in ponds. Comparisons of the amount and composition of food of the silver carp and the bighead carp lead to the conclusion that food competition of the latter species with respect to the common carp is considerably greater. Although neither silver carp nor bighead carp consumed feed given to the common carp (sorghum), and detritus was the main dietary component of the two former species of fish, the proportion of invertebrates in the food of bighead carp was greater and the components more similar to the food of the common carp. The silver carp consumed smaller zooplankton species, mainly *Bosmina longirostris* and rotifers, which were of no significance as food for the common carp. The bighead carp consumed large Cladocera and Copepoda species, and also Tendipedidae larvae, i.e. organisms constituting the basic component of the food of common carp.

MARICULTURE

81-002465 Jones, F. V. EFFECTS OF HYDROLOGICAL AND BIOLOGICAL VARIABLES ON THE SURVIVAL, GROWTH, AND FOOD UTILIZATION OF ESTUARINE FISHES CAGE-CULTURED IN A HEATED WATER SYSTEM. Ph.D. dissertation, Tex. A&M Univ. 324p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(3):894. Sept. 1981. SFA 26(4)

FEEDS, FEEDING, AND NUTRITION

81-002466 Arai, S. A PURIFIED TEST DIET FOR COHO SALMON, *ONCORHYNCHUS KISUTCH*, FRY. Bull. Jpn. Soc. Sic. Fish. 47(4):547-550. Apr. 1981. SFA 26(4)
[Natl. Res. Inst. Aquacult., Tamaki, Watarai-gun, Mie 519-04, Japan]

81-002467 Austreng, E. and T. Gjefsen. FISH OILS WITH DIFFERENT CONTENTS OF FREE FATTY ACIDS IN DIETS FOR RAINBOW TROUT FINGERLINGS AND SALMON PARR. Aquaculture 25(2-3):173-183. Aug. 1981. SFA 26(4)
[Dep. Poult. Fur Anim. Sci., Agric. Univ. Norway, N-1432 Ås-NLH, Ås, Norway]

81-002468 Burtle, G. J. ESSENTIALITY OF DIETARY INOSITOL FOR CHANNEL CATFISH. Ph.D dissertation, Auburn Univ. 42p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(1):2. July 1981. SFA 26(4)

81-002469 Campbell, D. L. PRELIMINARY HYBRID STRIPED BASS (*MORONE CHRYSOPS* X *MORONE SAXATILIS*) FEEDING STUDY. Annu. Proc. Tex. Chapter Am. Fish. Soc. 2:66-72. 1979(1980). SFA 26(4)
[Tex. Parks Wildl. Dep., Tyler 75709]

81-002470 Christensen, M. S. PRELIMINARY TESTS ON THE SUITABILITY OF COFFEE PULP IN THE DIETS OF COMMON CARP (*CYPRINUS CARPIO* L.) AND CATFISH (*CLARIAS MOSSAMBICUS* PETERS). Aquaculture 25(2-3):235-242. Aug. 1981.

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FEEDS, FEEDING, AND NUTRITION (CONTINUED)

81-002470 CONTINUED SFA 26(4)

[Im Trutz 35, 6000 Frankfurt Main, West Germany]

81-002471 Fowler, L. G. PROTEIN AND ENERGY RELATION OF STARTING DIETS FOR CHINOOK SALMON FRY. *Prog. Fish-Cult.* 43(3):151-153. July 1981. SFA 26(4)

[U.S. Fish Wildl. Serv., Abernathy Salmon Cult. Div. Cent., Longview, WA 98632]

81-002472 Gaspar, A. G. CRECIMIENTO, CONVERSION, EFICIENCIA Y MORTALIDAD DEL PAMPANO *TRACHINOTUS GOODEI* CONFINADO EN ESTANQUES DE CONCRETO. [GROWTH, CONVERSION EFFICIENCY AND MORTALITY OF POMPANO, *TRACHINOTUS GOODEI* CONFINED IN CONCRETE TANKS.] *Bol. Inst. Oceanogr. Univ. Oriente Cumana* 16(1-2):141-152. 1977. In Spanish with English summ. SFA 26(4)

[Cent. Invest. Cient., Univ. Oriente, Boca de Río, Isla de Margarita, Venezuela]

81-002473 Hilton, J. W.; C. Y. Cho and S. J. Slinger. EFFECT OF EXTRUSION PROCESSING AND STEAM PELLETING DIETS ON PELLET DURABILITY, PELLET WATER ABSORPTION, AND THE PHYSIOLOGICAL RESPONSE OF RAINBOW TROUT (*SALMO GAIIRDNERI* R.). *Aquaculture* 25(2-3):185-194. Aug. 1981. SFA 26(4)

[Dep. Nutr., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

81-002474 Ina, K. [AVAILABILITY OF PLANT PROTEIN AS DIETARY PROTEIN SOURCE FOR RED SEA BREAM *CHRYSOPHRYS MAJOR*.] *Bull. Jpn. Soc. Sci. Fish.* 47(5):627-630. May 1981. In Japanese with English summ. SFA 26(4)

[Dep. Agric. Chem., Fac. Agric., Shizuoka 442, Japan]

81-002475 Lee, C.-S.; F. Hu and R. Hirano. ORGANISMS SUITABLE AS FOOD FOR LARVAE OF BLACK SEA BREAM. *Prog. Fish-Cult.* 43(3):121-124. July 1981. SFA 26(4)

[Oceanic Inst., Waimanalo, HI 96795]

81-002476 Miao, S. THE EFFECT OF LIPID BY QUALITY AND QUANTITY IN ARTIFICIAL DIETS ON THE GROWTH OF *TILAPIA MOSSAMBICA* IN AQUARIUM CULTURE. *M.S. thesis, Northeast Mo. State Univ.* 174p. 1980. From Masters Abstr. 19(3):209. Sept. 1981. SFA 26(4)

81-002477 Mugrditchian, D. S.; R. W. Hardy and W. T. Iwaoka. LINSEED OIL AND ANIMAL FAT AS ALTERNATIVE LIPID SOURCES IN DRY DIETS FOR CHINOOK SALMON (*ONCORHYNCHUS TSHAWYTSCHA*). *Aquaculture* 25(2-3):161-172. Aug. 1981. SFA 26(4)

[Coll. Fish., Univ. Wash., Seattle 98195]

81-002478 Murai, T.; T. Akiyama and T. Nose. USE OF CRYSTALLINE AMINO ACIDS COATED WITH CASEIN IN DIETS FOR CARP. *Bull. Jpn. Soc. Sci. Fish.* 47(4):523-527. Apr. 1981. SFA 26(4)

[Div. Fish. Nutr., Natl. Res. Inst. Aquacult., Hiruta, Tamaki, Watari-gun, Mie 519-04, Japan]

81-002479 Schultz, D.; W. Hartfiel and E. Greuel. EIGNUNG EINER GEREINIGTEN DIÄT FÜR VERGLEICHENDE UNTERSUCHUNGEN AN REGENBOGENFORELLEN (*SALMO GAIIRDNERII*, R) UND COHO-LACHSEN (*ONCORHYNCHUS KISUTCH*).

SPORT FISHERY ABSTRACTS

FEEDS, FEEDING, AND NUTRITION (CONTINUED)

81-002479 CONTINUED [SUITABILITY OF A PURIFIED DIET FOR COMPARATIVE STUDIES WITH RAINBOW TROUT (*SALMO GAIARDNERII*, R) AND COHO SALMON (*ONCORHYNCHUS KISUTCH*).] *J. Anim. Physiol. Anim. Nutr.* 45(5):252-261. 1981. In German with English summ. SFA 26(4)

[Inst. Anat., Univ. Bonn, Katzenburgweg 7-9, 53 Bonn, West Germany]

81-002480 Takeuchi, T.; T. Watanabe; C. Ogino; M. Saito; K. Nishimura and T. Nose. EFFECTS OF LOW PROTEIN-HIGH CALORY DIETS AND DELETION OF TRACE ELEMENTS FROM A FISH MEAL DIET ON REPRODUCTION OF RAINBOW TROUT. *Bull. Jpn. Soc. Sci. Fish.* 47(5):645-654. May 1981. In Japanese with English summ. SFA 26(4)

[Lab. Fish Nutr., Tokyo Univ. Fish., Konan-4, Minato-ku, Tokyo 108, Japan]

81-002481 Takeuchi, T.; T. Watanabe; C. Ogino; M. Saito; K. Nishimura and T. Nose. [A LONG-TERM FEEDING WITH RAINBOW TROUT BY A LOW PROTEIN DIET WITH A HIGH ENERGY VALUE.] *Bull. Jpn. Soc. Sci. Fish.* 47(5):637-643. May 1981. In Japanese with English summ. SFA 26(4)

[Lab. Fish Nutr., Tokyo Univ. Fish., Konan-4, Minato-ku, Tokyo 108, Japan]

81-002482 Theis, G. L. and R. G. Howey. DISPENSER FOR LIVE FOOD ORGANISMS. *Prog. Fish-Cult.* 43(3):161-162. July 1981. SFA 26(4)

[P.O. Box 97, Zanesfield, OH 43360]

81-002483 Viola, S.; J. Arieli; U. Rappaport and S. Mokady. EXPERIMENTS IN THE NUTRITION OF CARP. REPLACEMENT OF FISHMEAL BY SOYBEANMEAL. *Bamidgeh* 33(2):35-49. June 1981. SFA 26(4)

[Miloubar Central Feedmill, D.N. Ashrat, Israel]

81-002484 Willis, D. W. and S. A. Flickinger. INTENSIVE CULTURE OF LARGEMOUTH BASS FRY. *Trans. Am. Fish. Soc.* 110(5):650-655. Sept. 1981. SFA 26(4)

[Kans. Fish Game Comm., Winfield 67156]

81-002485 Winfree, R. A. and R. R. Stickney. INEXPENSIVE AUTOMATIC FEEDER FOR FISH-FRY REARING TROUGHS. *Prog. Fish-Cult.* 43(3):155-156. July 1981. SFA 26(4)

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TRANSPORTING FISH

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81-002552 Yeager, B. L. EARLY DEVELOPMENT OF THE LONGEAR SUNFISH, *LEPOMIS MEGALOTIS* (RAFINESQUE). *J. Tenn. Acad. Sci.* 56(3):84-88. July 1981. SFA 26(4)

[TVA, Norris, TN 37828] Eggs and larvae of the longear sunfish, *Lepomis megalotis*, were collected from nests in the Clinch River in Tennessee. Eggs averaged 1.7 mm in diameter and were demersal and adhesive. Larvae, devoid of pigment, hatched at 5.1 mm total length (TL). Lack of finfold development or stomodeum, a straight urostyle, and a large ovoid yolk sac characterized protolarval longear sunfish. Pectoral fin buds were present at hatching. The yolk sac was absorbed between 7.3 and 7.6 mm TL. The mesolarval phase began between 6.6 and 7.2 mm; the metalarval by 11.8 mm TL. Longear sunfish attained the juvenile period by 14.2 mm TL. Longear sunfish differed from other leptomids as to the size at hatching, swim up size, state of finfold differentiation at given sizes, and body depth.

81-002553 Yoshizaki, K. A MORPHOLOGICAL STUDY ON THE MELANOPHORES OF SWORDTAIL *XIPHOPHORUS HELLERI*. *Bull. Jpn. Soc. Sci. Fish.* 47(6):747-751. June 1981. SFA 26(4)

[Fish. Lab., Fac. Agric., Nagoya Univ., Nagoya 464, Japan]

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81-002554 Ablett, R. F.; R. O. Sinnhuber and D. P. Seliconchick. THE EFFECT OF BOVINE INSULIN [¹⁴C] GLUCOSE AND [³H] LEUCINE INCORPORATION IN FED AND FASTED RAINBOW TROUT (*SALMO GAIIRDNERI*). *Gen. Comp. Endocrinol.* 44(4):418-427. Aug. 1981. SFA 26(4)

[Dep. Food Sci. Technol., Oreg. State Univ., Corvallis 97331]

81-002555 Agius, C. and R. J. Roberts. EFFECTS OF STARVATION ON THE MELANO-MACROPHAGE CENTRES OF FISH. *J. Fish Biol.* 19(2):161-169. Aug. 1981. SFA 26(4)

[Inst. Aquacult., Univ. Stirling, Stirling, Scotland]

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81-002556 Altringham, J. D. and I. A. Johnston. QUANTITATIVE HISTOCHEMICAL STUDIES OF THE PERIPHERAL INNERVATION OF COD (*GADUS MORHUA*) FAST MYOTOMAL MUSCLE FIBRES. *J. Comp. Physiol. A Sens. Neural Behav. Physiol.* 143(1):123-127. June 1981. SFA 26(4)

[Dep. Physiol., Univ. St. Andrews, St. Andrews, Fife KY16 9TS, Scotland]

81-002557 Ask, J. A.; G. Sten-Larsen and K. B. Helle. TEMPERATURE EFFECTS ON THE β_2 -ADRENOCEPTORS OF THE TROUT ATRIUM. *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 143(2):161-168. July 1981. SFA 26(4)

[Inst. Physiol., Univ. Bergen, N-5000 Bergen, Norway]

81-002558 Audet, C. and G. Chevalier. MONOAMINERGIC INNERVATION OF THE CAUDAL NEUROSECRETORY SYSTEM OF THE BROOK TROUT *SALVELINUS FONTINALIS* IN RELATION TO OSMOTIC STIMULATION. *Gen. Comp. Endocrinol.* 54(2):189-203. Oct. 1981. SFA 26(4)

[G. Chevalier: Dep. Sci. Biol., Univ. Quebec Montréal, C. P. 8888 Montréal, PQ H3C 3P8, Canada]

81-002559 Balayev, L. A. and N. N. Fursa. THE BEHAVIOR OF ECOLOGICALLY DIFFERENT FISH IN ELECTRIC FIELDS. I. THRESHOLD OF FIRST REACTION IN FISH. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):147-152. 1980. SFA 26(4)

[VNIRO, Moscow, USSR] the correlation of thresholds of the first reaction of fish with varying orientation in an electric field is diverse and depends on the ecology of the fish. In pelagic, active fish the threshold of the first reaction is lowest with the effect of ascending flow, greatest with cross-current effect. In bottom fish which are fairly inactive, the threshold of the first reaction is lowest with cross-current effect, with longitudinal effect the threshold values do not depend on the direction of current action. In the feeding eel the correlation of thresholds of the first reaction corresponds to that for bottom fish; in the downstream migrating eel to that for pelagic fish. The visually observed threshold of the first reaction is higher by 1 order than that established by means of the cardiogram.--Concl.

81-002560 Baynes, S. M.; A. P. Scott and A. P. Dawson. RAINBOW TROUT, *SALMO GAIARDNERII* RICHARDSON, SPERMATOZOA: EFFECTS OF CATIONS AND pH ON MOTILITY. *J. Fish Biol.* 19(3):259-267. Sept. 1981. SFA 26(4)

[Minist. Agric. Fish. Food, Lowestoft, Suffolk NR33 0HT, England]

81-002561 Beamish, F. W. H. SWIMMING PERFORMANCE AND METABOLIC RATE OF THREE TROPICAL FISHES IN RELATION TO TEMPERATURE. *Hydrobiologia* 83(2):245-254. 4 Sept. 1981. SFA 26(4)

[Dep. Zool., Coll. Biol. Sci., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

81-002562 Beaumont, A.-L.; T. F. Koss and A. H. Houston. RED CELL CARBONIC ANHYDRASE ACTIVITY AND CHLORIDE CONTENT IN GOLDFISH (*CARASSIUS AURATUS* L.) EXPOSED TO CONSTANT AND DIURNALLY-CYCLING TEMPERATURES. *Comp. Biochem. Physiol. A Comp. Physiol.* 70(3):431-434. 1981. SFA 26(4)

[A. H. Houston: Dep. Biol. Sci., Brock Univ., St. Catharines, ON L2S 3A1, Canada]

81-002563 Behrisch, H. W. MIGRATION DISTANCE, BODY CONDITION AND METABOLIC CAPACITY IN PACIFIC SALMON. *Proc. Alaska Sci. Conf. (Fairbanks)* 32:90-91. 1981. Abstract only. SFA 26(4)

[Inst. Arctic Biol., Div. Life Sci., Univ. Alaska, Fairbanks 99701] The Pacific Salmon (*Oncorhynchus* sp.) dies shortly after spawning. During its spawning migration, the salmon does not feed, and so this period of intense muscular and synthetic work is compounded by extended starvation. In the generally held view of starvation in vertebrates, and fish in particular, there is a gradual cessation of locomotor activity, accompanied by a loss of

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81-002563 CONTINUED metabolic capacity. In captive fish this may last for as long as 3-4 months. However, in all such studies, the animal is held quietly and is more or less (voluntarily) immobile. The migrating Pacific Salmon is in contrast almost constantly actively swimming against sometimes strong currents, and is at the same time depositing large amounts of material in the gonads, synthesizing carotenoid pigments, steroid hormones and undergoing gross morphological changes. Such processes can only be supported by an active metabolism which depends on body protein and fats. Coho salmon (*O. kisutch*) taken at various stages of migration (from early to very late) show remarkably similar patterns of enzyme activities--both glycolytic (muscle) and gluconeogenic (liver). The distance of migration--or perhaps more accurately--the duration of starvation may tentatively be assessed from relative weights of the stomach and digestive tract of the fish. The data suggest that the salmon maintains a very high level of intermediary metabolism from the beginning to the end of its spawning run. This high metabolism is supported by an enhanced hepatic gluconeogenesis which in turn draws upon body fats and protein. The chief sources of these are the gut and skeletal muscle, and there almost absolute depletion is geared to ensure the fish's arrival at the spawning grounds.

81-002564 Bell, M. V.; K. F. Kelly and J. R. Sargent. THE UPTAKE FROM FRESH WATER AND SUBSEQUENT CLEARANCE OF A VANADIUM BURDEN BY THE COMMON EEL (*ANGUILLA ANGUILLA*). *Sci. Total Environ.* 19(3):215-222. July 1981. SFA 26(4)
[NERC Inst. Mar. Biochem., St. Fittick's Rd., Aberdeen, AB1 3RA, Scotland]

81-002565 Billard, R.; B. Breton and M. Richard. ON THE INHIBITORY EFFECT OF SOME STEROIDS ON SPERMATOGENESIS IN ADULT RAINBOW TROUT (*SALMO GAIRDNERI*). *Can. J. Zool.* 59(8):1479-1487. Aug. 1981. SFA 26(4)
[I.N.R.A., Lab. Physiol. Poissons, 78350 Jouy en Josas, France]

81-002566 Botham, J. W. and M. J. Manning. THE HISTOGENESIS OF THE LYMPHOID ORGANS IN THE CARP *CYPRINUS CARPIO* L. AND THE ONTOGENETIC DEVELOPMENT OF ALLOGRAFT REACTIVITY. *J. Fish Biol.* 19(4):403-414. Oct. 1981. SFA 26(4)
[Dep. Zool., Univ. Hull, Hull, England]

81-002567 Breepoel, P. M.; F. Kreuzer and M. Hazevoet. STUDIES OF THE HEMOGLOBINS OF THE EEL (*ANGUILLA ANGUILLA* L.)-III. PROTON AND ORGANIC PHOSPHATE BINDING TO THE ROOT EFFECT HEMOGLOBIN COMPONENT. *Comp. Biochem. Physiol. A Comp. Physiol.* 69(4):709-712. 1981. SFA 26(4)
[Dep. Physiol., Univ. Nijmegen, Geert Grooteplein Noord 21a 6525 EZ Nijmegen, The Netherlands]

81-002568 Breton, B. A STUDY OF SALMON (*ONCORHYNCHUS TSCHAWYTSCHA*) PITUITARY GONADOTROPIN DISSOCIATION. *Gen. Comp. Endocrinol.* 45(2):147-152. Oct. 1981. SFA 26(4)
[Lab. Physiol. Poissons, INRA, Campus de Beaulieu, 35042 Rennes, France]

81-002569 Broussard, M. C., Jr. and R. R. Stickney. EVALUATION OF REPRODUCTIVE CHARACTERS FOR FOUR STRAINS OF CHANNEL CATFISH. *Trans. Am. Fish. Soc.* 110(4):502-506. July 1981. SFA 26(4)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

81-002570 Brown, B.; T. Smith; J. Woodard; R. MacGregor; K. Davis; C. Goudie; and B. Simco. EFFECTS OF ENUCLEATION AND PINEALECTOMY ON SEASONAL CHANGES OF PLASMA TESTOSTERONE ESTROGENS AND GONAD WEIGHTS IN CATFISH. *J.*

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81-002570 CONTINUED *Ala. Acad. Sci.* 52(3):110. July 1981. Abstract only. SFA 26(4)

[Univ. Ala., Birmingham 35294]

81-002571 Brown, D. J. A. and S. Lynam. THE EFFECT OF SODIUM AND CALCIUM CONCENTRATIONS ON THE HATCHING OF EGGS AND THE SURVIVAL OF THE YOLK SAC FRY OF BROWN TROUT, *SALMO TRUTTA* L. AT LOW pH. *J. Fish Biol.* 19(2):205-211. Aug. 1981. SFA 26(4)

[C.E.R.L. Freshwater Biol. Unit., Midlands Reg., Sci. Serv. Dep., Ratcliffe-on-Soar, Nottingham NG11 0EE, England] The effect of various external concentrations of sodium and calcium on the survival and hatching of brown trout, *Salmo trutta*, eggs at pH 4.5 was tested. A calcium concentration of approximately 10 ppm (500 $\mu\text{E l}^{-1}$) enables freshly fertilized eggs to survive whereas eyed ova are tolerant of deionized water acidified by sulphuric acid with no other ions added. Concentrations of sodium and calcium of 1 ppm (44 and 50 $\mu\text{E l}^{-1}$, respectively) are sufficient to ensure the successful hatching of eyed ova and subsequent survival of the alevins. At pH 4.5 hatching is prolonged by the alevins passing through a temporary encapsulated stage.

81-002572 Cameron, J. S. and S. E. Brown. ADRENERGIC AND CHOLINERGIC RESPONSES OF THE ISOLATED HEART OF THE GOLDFISH, *CARASSIUS AURATUS*. *Comp. Biochem. Physiol. C Comp. Pharmacol.* 70(1):109-115. 1981. SFA 26(4)

[Dep. Pharmacol. (R-189), Univ. Miami Sch. Med., P.O. Box 016189, Miami, FL 33101]

81-002573 Carey, F. G.; J. M. Teal and J. W. Kanwisher. THE VISCERAL TEMPERATURES OF MACKEREL SHARKS (LAMNIDAE). *Physiol. Zool.* 54(3):334-344. July 1981. SFA 26(4)

[Wood Hole Oceanogr. Inst., Woods Hole, MA 02543] The viscera of mako *Isurus oxyrinchus* and porbeagle *Lamna nasus* sharks are significantly warmer than the water. The large suprahepatic rete mirabile in these fish is identified as a heat exchanger which retains metabolic heat to warm the visceral organs. An argument is presented that the efficiency of heat exchange in the rete must be greater than 97% to maintain the observed tissue temperatures and than this requirement explains the large size of the rete. A venous passage with a muscular wall which runs through the suprahepatic rete could allow blood to bypass the heat exchanger, and its presence suggests a simple mechanism for controlling temperature. However, measurements of temperature by acoustic telemetry from free-swimming sharks over a 4.5-day period do not give a convincing indication that stomach temperature is altered in a manner independent of the environment.

81-002574 Carter, H. J. ASPECTS OF THE PHYSIOLOGICAL ECOLOGY OF SPECIES OF *GAMBUSIA* FROM BELIZE, CENTRAL AMERICA. *Copeia* 1981(3):694-700. 26 Aug. 1981. SFA 26(4)

[Va. Inst. Mar. Sci., Gloucester Point 23062] Aspects of the physiological ecology of three species of *Gambusia* from Belize, Central America were investigated through field observations and experimental analyses. These species, mainland *Gambusia yucatana* (slender-bodied), marine *G. yucatana*, *G. sexradiata* and *G. luma*, have different distributions within Belize. Direct transfer and salinity selection tests indicate mainland *G. yucatana* (slender-bodied) and marine *G. yucatana* tolerate changes in salinity to a greater extent than do *G. luma* or *G. sexradiata*. Ecological distributions indicate mainland *G. yucatana* (slender-bodied) and marine *G. yucatana* occur more frequently along northern coastal areas and offshore localities, whereas *G. luma* and *G. sexradiata* occur usually at inland localities away from the influence of the sea. Determination of plasma osmotic concentrations indicates that mainland *G. yucatana* (slender-bodied) and marine *G. yucatana* have a greater ability than either *G. luma* or *G. sexradiata* to quickly adjust to elevated salinities. These features may contribute to habitat selection.

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81-002575 Casey, C. A. ASPECTS OF AMMONIAGENESIS IN THE CHANNEL CATFISH *ICTALURUS PUNCTATUS*. Ph.D. dissertation, Rice Univ. 130p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(2):466. Aug. 1981. SFA 26(4)

Data presented in this thesis effectively eliminate the purine nucleotide cycle as a viable mechanism for catabolizing amino acids in catfish liver. If transdeamination is the pathway utilized in fish during ammoniogenesis, the process of ammonia release from the mitochondria may be different than the mechanism used by ureoteles or uricoteles.--From abstr.

81-002576 Crisp, D. T. A DESK STUDY OF THE RELATIONSHIP BETWEEN TEMPERATURE AND HATCHING TIME FOR THE EGGS OF FIVE SPECIES OF SALMONID FISHES. *Freshwater Biol.* 11(4):361-368. Aug. 1981. SFA 26(4)

[Freshwater Biol. Assoc., Teesdale Unit, England] Information on temperature ($T^{\circ}\text{C}$) and time from fertilization to 50% hatch (D days) for five species of salmonid fishes has been used to assess several mathematical models relating D and T . No single equation gave the best fit to all five data sets. The power law with temperature correction (α), $\log_{10}D = \log_{10}a + b \log_{10}(T - \alpha)$ and the quadratic, $\log_{10}D = \log_{10}a + bT + b_1T^2$ (where a , b , b_1 and α are constants), each accounted for over 97% of the variance of D and were good fits to the observed data points for all five species. There was little difference between the predictions obtained from these two equations within the range of observed temperatures. Therefore, the simpler power-law model is preferred. However, there were substantial within-species differences between values of D predicted from extrapolations of the two models from 2 or 3°C down to 0°C. When more data for low temperatures become available it will be possible to make a more objective choice of model.

81-002577 Czczuga, B. CAROTENOIDS IN FISH--XXX. RHODOXANTHIN IN *CTENOPHARYNGODON IDELLA* VAL. (CYPRINIDAE). *Comp. Biochem. Physiol. B Comp. Biochem.* 69(4):885-887. 1981. SFA 26(4)

[Dep. Gen. Biol., Med. Acad., 15-230 Białystok, Poland]

81-002578 Davenport, J.; S. Lønning and E. Kjørsvik. OSMOTIC AND STRUCTURAL CHANGES DURING EARLY DEVELOPMENT OF EGGS AND LARVAE OF THE COD, *GADUS MORHUA* L. *J. Fish Biol.* 19(3):317-331. Sept. 1981. SFA 26(4)

[N.E.R.C. Unit Mar. Invert. Biol., Mar. Sci. Lab., Menai Bridge, Gwynedd, LL59 5EH, United Kingdom]

81-002579 Davie, P. S. NEUROANATOMY AND CONTROL OF THE CAUDAL LYMPHATIC HEART OF THE SHORT-FINNED EEL (*ANGUILLA AUSTRALIS SCHMIDTII*). *Can. J. Zool.* 59(8):1586-1592. Aug. 1981. In English with French summ. SFA 26(4)

[Dep. Physiol. Anat., Massey Univ., Palmerston North, New Zealand]

81-002580 de Ruiter, A. J. H. TESTOSTERONE-DEPENDENT CHANGES IN VIVO AND IN VITRO IN THE STRUCTURE OF THE RENAL GLOMERULI OF THE TELEOST *GASTEROSTEUS ACULEATUS* L. *Cell Tissue Res.* 219(2):253-266. Aug. 1981. SFA 26(4)

[Dep. Zool., State Univ. Groningen, P.O. Box 14, 9750 AA Haren, The Netherlands]

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[Inst. Zoophysiol., Univ. Uppsala, Sweden]

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[M. H. Taylor: Sch. Life Health Sci., Univ. Del., Newark 19711]
- 81-002583 Eales, J. G. and R. J. Omeljaniuk. EFFECT OF PYRAZOLE ON THYROID FUNCTION IN RAINBOW TROUT, *SALMO GAIIRDNERI*. *Gen. Comp. Endocrinol.* 45(2):279-282. Oct. 1981. SFA 26(4)
[Dep. Zool., Univ. Manitoba, Winnipeg, MB R3T 2N2, Canada]
- 81-002584 Eales, J. G.; M. Hughes and L. Uin. EFFECT OF FOOD INTAKE ON DIET VARIATION IN PLASMA THYROID HORMONE LEVELS IN RAINBOW TROUT, *SALMO GAIIRDNERI*. *Gen. Comp. Endocrinol.* 45(2):167-174. Oct. 1981. SFA 26(4)
[Dep. Zool., Univ. Manitoba, Winnipeg, MB R3T 2N2, Canada]
- 81-002585 Forster, M. E. EFFECTS OF CATECHOLAMINES ON THE HEARTS AND VENTRAL AORTAS OF THE EELS *ANGUILLA AUSTRALIS SCHMIDTII* AND *ANGUILLA DIEFFENBACHII*. *Comp. Biochem. Physiol. C Comp. Pharmacol.* 70(1):85-90. 1981. SFA 26(4)
[Dep. Zool., Univ. Canterbury, Christchurch 1, New Zealand]
- 81-002586 Fraisse, M.; N. Y. S. Woo; J. Noaillac-Depeyre and J. C. Murat. DISTRIBUTION PATTERN OF DIGESTIVE ENZYME ACTIVITIES IN THE INTESTINE OF THE CATFISH (*AMEIURUS NEBULOSUS* L.) AND OF THE CARP (*CYPRINUS CARPIO* L.). *Comp. Biochem. Physiol. A Comp. Physiol.* 70(3):443-446. 1981. SFA 26(4)
[J.C. Murat: Inst. Physiol., Univ. Paul Sabatier, 2 rue F. Magendie, 31400 Toulouse, France]
- 81-002587 Frankel, J. S. COMPARATIVE ANALYSIS OF LACTATE DEHYDROGENASE ISOZYMES IN NEURAL TISSUES OF *POECILIA* (POECILIIDAE). *Comp. Biochem. Physiol. B Comp. Biochem.* 69(4):881-884. 1981. SFA 26(4)
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- 81-002588 French, J. S. LIVER MICROSOMAL MONOOXYGENASE COMPONENTS FROM COHO SALMON SMOLTS (*ONCORHYNCHUS KISUTCH*). *Proc. Alaska Sci. Conf. (Fairbanks)* 32:93-94. 1981. Abstract only. SFA 26(4)
[Chem. Dep., Univ. Alaska, Anchorage 99504]
- 81-002589 Furuichi, M. and Y. Yone. CHANGE OF BLOOD SUGAR AND PLASMA INSULIN LEVELS OF FISHES IN GLUCOSE TOLERANCE TEST. *Bull. Jpn. Soc. Sci. Fish.* 47(6):761-764. June 1981. SFA 26(4)
[Fish. Res. Lab., Kyushu Univ., Tsuyazaki, Fukuoka 811-33, Japan]
- 81-002590 Gee, J. H. COORDINATION OF RESPIRATORY AND HYDROSTATIC FUNCTIONS OF THE SWIMBLADDER IN THE CENTRAL MUDMINNOW, *UMBRA LIMI*. *J. Exp. Biol.* 92:37-52. June 1981. SFA 26(4)
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- 81-002591 Gibb, B.; N. Grobe and G. Fiedler. DISK-UND IMMUNELEKTROPHORETISCHE BEFUNDE AN SERUMPROTEINEN DES EUROPÄISCHEN FLUSSAALS, *ANGUILLA ANGUILLA* (L.). [DISC- AND IMMUNOELECTROPHORETIC FINDINGS ON SERUM PROTEINS OF THE COMMON EUROPEAN EEL, *ANGUILLA ANGUILLA* (L.).] *Zool. Anz.* 206(3/4):181-188. 1981. In German with English summ. SFA 26(4)
[Inst. Gerich. Med. Krimin., Ernst-Mortiz-Arndt-Univ., DDR-2200 Greifswald, Kuhstrasse 30, West Germany]

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81-002592 Glebe, B. D. and W. C. Leggett. LATITUDINAL DIFFERENCES IN ENERGY ALLOCATION AND USE DURING THE FRESHWATER MIGRATIONS OF AMERICAN SHAD (*ALOSA SAPIDISSIMA*) AND THEIR LIFE HISTORY CONSEQUENCES. *Can. J. Fish. Aquatic Sci.* 38(7):806-820. July 1981. In English with French summ. SFA 26(4)
[North Am. Salmon Res. Inst., Huntsman Mar. Lab., St. Andrews, NB E0G 2X0, Canada]

81-002593 Glebe, B. D. and W. C. Leggett. TEMPORAL, INTRA-POPULATION DIFFERENCES IN ENERGY ALLOCATION AND USE BY AMERICAN SHAD (*ALOSA SAPIDISSIMA*) DURING THE SPAWNING MIGRATION. *Can. J. Fish. Aquatic Sci.* 38(7):795-805. July 1981. In English with French summ. SFA 26(4)
[North Am. Salmon Res. Inst., Huntsman Mar. Lab., St. Andrews, NB E0G 2X0, Canada]

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[Scripps Inst. Oceanogr., La Jolla, CA 92093]

81-002595 Guest, W. C. and B. W. Lyons. TEMPERATURE TOLERANCE OF THE PEACOCK BASS (*CICHLA TEMENSIS*). *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 3:42-48. 1980(1981). SFA 26(4)
[Tex. Parks Wildl. Dep., Heart of the Hills Res. Stn., Ingram 78025] Effects of temperature on survival of *C. temensis* fingerlings were examined in the laboratory. Fish were acclimated at 25, 30 or 35 C prior to testing. The lower and upper lethal temperatures were 17.1 and 39.0 C, respectively when the temperature change from acclimation was 1 C/day. Acclimation temperature significantly affected the temperature at which peacock bass began losing equilibrium (LE₅₀) and dying (CTmin) when fish were exposed to a 1 C/h decrease. LE₅₀'s for the 35, 30 and 25 C acclimation temperatures were 17.9, 16.7 and 14.0 C, respectively. *C. temensis* can withstand rapid temperature decreases as long as water temperatures do not decline below their lower lethal temperature.

81-002596 Hannah, G. S. and G. E. Pickford. DIURNAL PEAKS IN THE HEMATOCRIT AND IN SERUM SODIUM IN THE KILLIFISH, *FUNDULUS HETEROCLITUS*, AND THEIR ABSENCE IN SERUM POTASSIUM AND CHLORIDE: A LACK OF CORRELATION. *Comp. Biochem. Physiol. A Comp. Physiol.* 70(1):157-159. 1981. SFA 26(4)
[G. E. Pickford: Dep. Biol., Hiram Coll., Hiram, OH 44234]

81-002597 Herzberg, A. and R. Pasteur. PROXIMATE COMPOSITION AND PRELIMINARY DATA ON FRESHNESS DETERMINATION OF SILVER CARP (*HYPOPTAHALMICHTHYS MOLITRIX* (VAL.)). *Bamidgeh* 33(3):87-99. Sept. 1981. SFA 26(4)
[Minist. Agric., Fish. Dep., Fish Products Lab., Haifa, P.O.B. 699, Israel]

81-002598 Holland, K. N. and J. H. Teeter. BEHAVIORAL AND CARDIAC REFLEX ASSAYS OF THE CHEMOSENSORY ACUITY OF CHANNEL CATFISH TO AMINO ACIDS. *Physiol. Behav.* 27(4):699-707. Oct. 1981. SFA 26(4)
[Hawaii Inst. Mar. Biol., P.O. Box 1346, Coconut Island, Kaneohe 96744]

81-002599 Holmgren, S. and S. Nilsson. ON THE NON-ADRENERGIC, NON-CHOLINERGIC INNERVATION OF THE RAINBOW TROUT STOMACH. *Comp. Biochem. Physiol. C Comp. Pharmacol.* 70(1):65-69. 1981. SFA 26(4)
[Dep. Zoophysiol., Univ. Göteborg, Box 250 59, S-400 31 Göteborg, Sweden]

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81-002600 Holmgren, S. CHOLINE ACETYLTRANSFERASE ACTIVITY IN THE HEART FROM TWO TELEOSTS, *CADUS MORHUA* AND *SALMO GAIIRDNERI*. *Comp. Biochem. Physiol. C Comp. Pharmacol.* 69(2):403-405. 1981. SFA 26(4)

[Dep. Zoophysiol., Univ. Göteborg, Box 250 59, S-400 31 Göteborg, Sweden]

81-002601 Houston, A. H. and K. M. Mearow. THERMOACCLIMATORY MODIFICATION OF RED CELL IONIC COMPOSITION IN RAINBOW TROUT, *SALMO GAIIRDNERI*: POSSIBLE RELATIONSHIP WITH (Na^+/K^+) -AND (HCO_3^-) -STIMULATED ATPASE ACTIVITIES. *Comp. Biochem. Physiol. A Comp. Physiol.* 70(3):315-319. 1981. SFA 26(4)

[Dep. Biol. Sci., Brock Univ., St. Catharines, ON L2S 3A1, Canada]

81-002602 Hunter, J. Roe and R. Leong. THE SPAWNING ENERGETICS OF FEMALE NORTHERN ANCHOVY, *ENGRAULIS MORDAX*. *Fish. Bull.* 79(2):215-230. Apr. 1981. SFA 26(4)

[NMFS, La Jolla, CA 92038] The seasonal pattern in incidence of postovulatory follicles in northern anchovy females indicated that they spawn about 20 times per year. The maturation rates of females in the laboratory indicated that they were capable of maturing a spawning batch of eggs at weekly intervals. Examination of the egg size frequency distributions in sea-caught specimens indicated that vitellogenesis and egg maturation continued until the last spawning. We evaluated for northern anchovy the fat-water balance, caloric values of tissues, annual fat cycle, seasonal changes in egg weight, total calories present in a mature ovary, batch fecundity; and determined in the laboratory the gross caloric conversion efficiency (12.8%). These measurements indicated that the caloric equivalent of only two spawning batches are present in a mature ovary at any time and that two-thirds of the annual cost of 20 spawnings could be supplied by fat stores. Estimates of annual reproductive effort (egg calories/ration calories X 100) ranged from 8% for 1 year to 11% for 3-year-old females. A daily ration of copepods equivalent of 4-5% of female wet weight per day is required to support the annual cost of growth and reproduction.

81-002603 Ingermann, R. L. and R. C. Terwilliger. INTRAERYTHROCYTIC ORGANIC PHOSPHATES OF FETAL AND ADULT SEAPERCH (*EMBLOTOKA LATERALIS*): THEIR ROLE IN MATERNAL-FETAL OXYGEN TRANSPORT. *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 144(2):253-259. 11 Sept. 1981. SFA 26(4)

[Dep. Biol., Oreg. Inst. Mar. Biol., Univ. Oreg., Charleston 97420]

81-002604 Itazawa, Y. and A. Ishimatsu. GAS EXCHANGE IN AN AIR-BREATHING FISH, THE SNAKEHEAD *CHANNA ARGUS*, IN NORMOXIC AND HYPOXIC WATER AND IN AIR. *Bull. Jpn. Soc. Sci. Fish.* 47(7):829-834. July 1981. SFA 26(4)

[Dep. Fish., Fac. Agric., Kyushu Univ., 46-4 Hakozaki, Higashi-ku, Fukuoka 812, Japan]

81-002605 Jansen, W. F.; W. F. G. Flight and M. A. Zandbergen. FINE STRUCTURAL LOCALIZATION OF ADENOSINE TRIPHOSPHATASE ACTIVITIES IN THE SACCUS VASCULOSUS OF THE RAINBOW TROUT, *SALMO GAIIRDNERI* RICHARDSON. *Cell Tissue Res.* 219(2):267-279. Aug. 1981. SFA 26(4)

[Zool. Lab., Sect. Histol. Cell Biol., State Univ. Utrecht, Transitorium III, Padualaan 8, 3508 TB Utrecht, The Netherlands]

81-002606 Jobling, M. DIETARY DIGESTIBILITY AND THE INFLUENCE OF FOOD COMPONENTS ON GASTRIC EVACUATION IN PLAICE, *PLEURONECTES PLATESSA* L. *J. Fish Biol.* 19(1):29-36. July 1981. SFA 26(4)

[Inst. Fisker., Univ. Tromsø, 9001, Tromsø, Norway]

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81-002607 Jobling, M. MATHEMATICAL MODELS OF GASTRIC EMPTYING AND THE ESTIMATION OF DAILY RATES OF FOOD CONSUMPTION FOR FISH. *J. Fish Biol.* 19(3):245-257. Sept. 1981. SFA 26(4)

[Inst. Fiskerifag, Univ. Tromsø, 9001 Tromsø, Norway] The literature relating to gastric evacuation in fishes is reviewed and, where appropriate, the data is re-analysed and fitted to mathematical models to gastric emptying. A volume dependent model of emptying is suggested as being most appropriate and data for most species are adequately described by an equation of the form $dv/dT = -cv^{0.5}$. The gastric emptying equations are then incorporated into models for the estimation of daily food consumption of fishes and the accuracy of the predictions tested.

81-002608 Kagawa, H.; K. Takano and Y. Nagahama. CORRELATION OF PLASMA ESTRADIOL-17 β AND PROGESTERONE LEVELS WITH ULTRASTRUCTURE AND HISTOCHEMISTRY OF OVARIAN FOLLICLES IN THE WHITE-SPOTTED CHAR, *SALVELINUS LEUCOMAENIS*. *Cell Tissue Res.* 218(2):315-329. July 1981. SFA 26(4)

[Y. Nagahama: Lab. Reprod. Biol., Natl. Inst. Basic Biol., Okazaki, Japan 444]

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[Food Res. Lab., Tech. Res. Cent. Finland, 02150 Espoo 15, Finland]

81-002610 Kazakov, R. V. and L. M. Khalyapina. OXYGEN CONSUMPTION OF ADULT ATLANTIC SALMON (*SALMO SALAR* L.) MALES AND FEMALES IN FISH CULTURE. *Aquaculture* 25(2-3):289-292. Aug. 1981. SFA 26(4)

[GosNIORKh, Makarova Embankment, 26, Leningrad, USSR] Rates of oxygen consumption per unit weight were found to be lower in salmon spawners than in juvenile fish. The rates were higher in males than in females and declined with increasing age in both sexes. Data are presented on critical and lethal thresholds of environmental oxygen for adults at the time of spawning.

81-002611 Keesen, H. W.; H.-J. Langholz and K. Wolf. DIE BEWERTUNG DES SAUERSTOFFS IN DER FORELLENPRODUKTION UNTER BERÜCKSICHTIGUNG SPEZIELLER UMWELTBEDINGUNGEN. [OXYGEN ASSESSMENT IN TROUT PRODUCTION WITH REGARD TO SPECIAL ENVIRONMENTAL CONDITIONS.] *Arch. Fischereiwiss.* 31(3):115-121. July 1981. In German with English summ. SFA 26(4)

[Inst. Tierzucht Haustiergenet., Univ. Gottingen, Albrecht-Thaer-Weg 1, 3400 Gottingen, West Germany] Oxygen consumption in relation to oxygen supply was investigated in a factorial experiment taking simultaneously into account body weight per fish and feeding intensity. Furthermore the effect on growth performance was studied. The following results were obtained: When dissolved oxygen supply (concentration in fresh water) was reduced from 8 mg/l to 4 mg/l, oxygen consumption declined by 17% and growth performance by 34%. Oxygen consumption per kg fish mass in fish weighing on average 24g was by 17% higher than that in fish weighing on average 65g. At the same time, weight increase in the larger animals during the 6-week experimental period was by 19% higher. Feeding intensity reduced to 80% of that of standard feeding (100%) resulted in that oxygen consumption decreased by only 4%, while growth performance declined by 32%. Thus oxygen requirement standards have to be indicated for the specific management and feeding conditions of the different production systems. This includes also the consideration of all those environmental factors which have a significant effect upon specific behavioural patterns (competition).

81-002612 Kostecki, P. T. IONIC AND OSMOTIC REGULATION IN RAINBOW TROUT, *SALMO GAIRDNERI*. Ph.D. dissertation, Univ. Mich. 103p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(2):520. Aug. 1981. SFA 26(4)

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81-002614 Kuz'mina, V. V. and I. L. Golovanova. THE EFFECT OF pH ON THE AMYLOLYTIC ACTIVITY OF THE INTESTINAL MUCOSA IN SOME SPECIES OF FRESHWATER TELEOSTS. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(3):157-162. 1980. SFA 26(4)

[Lab. Ichthyol., Inst. Biol. Inland Waters, USSR Acad. Sci., Borok, Yaroslavl Reg., USSR]

81-002615 Léger, C. EFFECT D'UN JEÛNE PROLONGÉ SUR LA COMPOSITION EN LIPIDES ET EN ACIDES GRAS DE LA TRUITE ARC-EN-CIEL, *SALMO GAIRDNERI*. [EFFECT OF PROLONGED FASTING ON LIPID AND FATTY ACID COMPOSITION IN RAINBOW TROUT, *SALMO GAIRDNERI*.] *Aquaculture* 25(2-3):195-206. Aug. 1981. In French with English summ. SFA 26(4)

[Stn. Rech. Nutr., C.N.R.Z.-I.N.R.A., 78 350 Jouy-en-Josas, France]

81-002616 Laming, P. R. and G. Savage. SEASONAL DIFFERENCES IN BRAIN ACTIVITY AND RESPONSIVENESS SHOWN BY THE GOLDFISH, (*CARASSIUS AURATUS*). *Behav. Neural Biol.* 32(3):386-389. July 1981. SFA 26(4)

[Dep. Zool., Queen's Univ., Belfast BT7 1NN, Northern Ireland]

81-002617 Laming, P. R. and P. Hornby. THE EFFECT OF UNILATERAL TELENCEPHALIC LESIONS ON BEHAVIORAL AROUSAL AND ITS HABITUATION IN THE ROACH *RUTILUS RUTILUS*. *Behav. Neural Biol.* 33(1):59-65. Sept. 1981. SFA 26(4)

[Dep. Zool., Queen's Univ., Belfast BT7 1NN, Northern Ireland]

81-002618 Larrick, S. R.; D. S. Cherry and J. Cairns, Jr. INFLUENCE OF ACUTE COLD SHOCK ON ACETAZOLAMIDE-SENSITIVE ESTERASE ACTIVITY IN THE BLUEGILL SUNFISH (*LEPOMIS MACROCHIRUS*). *Va. J. Sci.* 32(3):95. 1981. Abstract only. SFA 26(4)

[Dep. Biol. Sci., Old Dominion Univ., Norfolk, VA 23508]

81-002619 Leatherland, J. F.; R. A. Sonstegard and R. D. Moccia. INTERLAKE DIFFERENCES IN BODY AND GONAD WEIGHTS AND SERUM CONSTITUENTS OF GREAT LAKES COHO SALMON (*ONCORHYNCHUS KISUTCH*). *Comp. Biochem. Physiol. A Comp. Physiol.* 69(4):701-704. 1981. SFA 26(4)

[Dep. Zool., Coll. Biol. Sci., Univ. Guelph, Guelph, ON, Canada] Significant interlake differences were observed in body weight, gonadosomatic index (GSI), serum osmotic pressure and serum Na^+ , K^+ , Cl^- , Ca^{2+} and Mg^{2+} concentrations of prespawning potamodromous coho salmon (*Oncorhynchus kisutch*) collected from Lakes Ontario, Erie and Michigan. Highest body weight and GSI values were found in coho salmon from Lakes Ontario and Michigan respectively. Coho salmon from Lake Erie were markedly hypocalcemic and hyperkalemic compared with salmon from the other lakes. There was no clear correlation between the degree of thyroid dysfunction in coho salmon from different Great Lakes and interlake differences in any of the parameters measured.

81-002620 Lee, C. and B. Menu. EFFECTS OF SALINITY ON EGG DEVELOPMENT AND HATCHING IN GREY MULLET *MUGIL CEPHALUS* L. *J. Fish Biol.* 19(2):179-188. Aug. 1981. SFA 26(4)

[Oceanic Inst., Waimanalo, HI 96795] Grey mullet, *Mugil cephalus*, collected from ponds were induced to spawn with carp pituitary homogenate and human chorionic gonadotropin (HCG) at 30‰ salinity and 26°C. The spontaneously spawned and fertilized eggs were transferred to sea water of different salinities in the range of 5-7‰, either at the 2-blastomere or the gastrula stage. Those eggs transferred at the gastrula stage were more

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81-002620 CONTINUED tolerant to the salinity change than were those transferred at the 2-blastomere stage. The eggs did develop to the embryonic stage within the salinity range from 5 to 60‰. Hatching occurred in all salinities between 10 and 55‰. However, no larvae survived at 10 or 55‰. The optimal salinity range for eggs incubating at 22.0-25.5°C was from 30 to 40‰ salinity, with the peak at 35‰.

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[C.N.R.S., Lab. Physiol. Comp. Reg., B.P. 20 CR, F-67037 Strasbourg-Cédex, France]

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[Mus. Comp. Zool., Harvard Univ., Cambridge, MA 02138]

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[Sch. Environ., Murdoch Univ., Murdoch, Western Australia 6150, Australia]

81-002625 Mandrup-Poulsen, J. CHANGES IN SELECTED BLOOD SERUM CONSTITUENTS, AS A FUNCTION OF SALINITY VARIATIONS, IN THE MARINE ELASMOBRANCH, *SPHYRNA TIBURO*. *Comp. Biochem. Physiol. A Comp. Physiol.* 70(1):127-131. 1981. SFA 26(4)
[Dep. Oceanogr., Fla. State Univ., Tallahassee 32306]

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[Dep. Nat. Resour., Cornell Univ., Ithaca, NY 14853]
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[Cent. Physiopathol. Thyroid. C.N.R., Univ. Rome, II Clinica Med., Policlinico Umberto I, 00100 Rome, Italy]
- 81-002632 Moskal'kova, K. I. PARTICIPATION OF THE GUT IN DIGESTION IN EMBRYOS OF THE TELEOST *NEOGOBIOUS MELANOSTOMUS* (PALLAS) (PISCES, GOBIIDAE). *Dokl. Biol. Sci.* (Engl. Transl. Dokl. Akad. Nauk SSR Ser. Biol.) 255(1-6):538-540. May 1981. SFA 26(4)
[Severtsov Inst. Evol. Anim. Morphol. Ecol., Acad. Sci. USSR, Moscow, USSR]
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[Dep. Zoophysiol., Univ. Göteborg, Box 250 59, S-400 33 Göteborg, Sweden]
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[Dep. Biol., Southwestern at Memphis, Memphis, TN 38112]

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[Freshwater Biol., Assoc., The Ferry House, Far Sawrey, North Ambleside, Cumbria LA22 0LP, England]

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[Inst. Aquacult., Univ. Stirling, Stirling FK9 4LA, Scotland]
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[Lab. Exp. Ichthyol., Biol. Res. Inst., Leningrad Univ., USSR]
- 81-002654 Sakai, D. K. HEAT INACTIVATION OF COMPLEMENTS AND IMMUNE HEMOLYSIS REACTIONS IN RAINBOW TROUT, MASU SALMON, COHO SALMON, GOLDFISH AND TILAPIA. *Bull. Jpn. Soc. Sci. Fish.* 47(5):565-571. May 1981. SFA 26(4)
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- 81-002655 Schulz, R.; R. Schlaghecke and V. Blüm. VARIATIONS OF GONADAL cAMP-CONTENT OF MALE AND FEMALE RAINBOW TROUT, *SALMO GAIARDNERI* (RICHARDSON) DURING THE REPRODUCTIVE CYCLE. *Comp. Biochem. Physiol. A Comp. Physiol.* 70(1):53-56. 1981. SFA 26(4)
[Ruhr-Univ. Bochum, Arbeitsgr. vergl. Endokrinol., Universitätstr. 150, 4630 Bochum, West Germany]

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[Res. Unit Fish Biol., Rand Afrikaans Univ., P.O. Box 524, Johannesburg 2000, South Africa] *Sarotherodon mossambicus*, *Cyprinus carpio* and *Salmo gairdneri* were acclimatized at temperatures of 15, 20 and 25°C in order to study physiological responses of blood to temperature fluctuations in the laboratory. *Cyprinus carpio* exhibited the greater ability to survive at these temperatures. *Sarotherodon mossambicus* experienced osmoregulatory collapse at 15°C which also occurred in trout at 25°C. This was associated with acid-base malfunction in the trout.

81-002660 Smith, M. A. K. ESTIMATION OF GROWTH POTENTIAL BY MEASUREMENT OF TISSUE PROTEIN SYNTHETIC RATES IN FEEDING AND FASTING RAINBOW TROUT, *SALMO GAIKNERII* RICHARDSON. *J. Fish Biol.* 19(2):213-220. Aug. 1981. SFA 26(4)
[c/o Foreign Commonwealth Off., King Charles St., London SW1A 2AH, England] Protein synthesis in liver, gill and muscle tissue was measured *in vivo* by constant infusion of ¹⁴C-tyrosine in fed and fasted freshwater rainbow trout, *Salmo gairdnerii*, at 12°C. Synthesis rates (percentage of tissue protein synthesized per day) were 15-17% in liver, 4-5% in gill and 0.38% in muscle of fed fish. Liver and gill synthesis rate showed no significant change in fish that had been without food for 15 days, whereas muscle protein synthesis fell to 0.09%. The greater susceptibility of muscle protein synthesis to fasting, possibly results from the greater proportion of synthesis retained as growth in this tissue. Growth rates indicate little change in protein turnover in the muscle but increased protein degradation with fasting. The difference between fed and fasted synthesis rates in muscle may be used as a measurement of potential growth rate for a particular species.

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[Dep. Biol., Univ. Nev., Las Vegas 89154]

81-002664 Suarez, R. K. and P. W. Hochachka. THE PYRUVATE BRANCH POINT IN FISH LIVER MITOCHONDRIA: EFFECTS OF ACYLCARNITINE OXIDATION ON PYRUVATE DEHYDROGENASE AND PYRUVATE CARBOXYLASE ACTIVITIES. *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 143(2):275-279. July 1981. SFA 26(4)
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81-002668 Sugita, H.; Y. Deguchi; T. Sakata; Y. Ishida and H. Kadota. MEASUREMENT OF TOTAL VIABLE COUNTS IN THE GASTRO-INTESTINAL BACTERIA OF FRESHWATER FISH. *Bull. Jpn. Soc. Sci. Fish.* 47(4):555. Apr. 1981. In Japanese. SFA 26(4)
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81-002669 Swift, D. J. CHANGES IN SELECTED BLOOD COMPONENT CONCENTRATIONS OF RAINBOW TROUT, *SALMO GAIARDNERI* RICHARDSON, EXPOSED TO HYPOXIA OR SUBLETHAL CONCENTRATIONS OF PHENOL OR AMMONIA. *J. Fish Biol.* 19(1):45-61. July 1981. SFA 26(4)
[Div. Fish. Res., Minist. Agric. Fish Food, Fish Lab., Pakefield Rd., Lowestoft, Suffolk, NR33 0HT, England]

81-002670 Tátrai, I. DIURNAL PATTERN OF THE AMMONIA AND UREA EXCRETION OF FEEDING AND STARVED BREAM, *ABRAMIS BRAMA* L. *Comp. Biochem. Physiol. A Comp. Physiol.* 70(2):211-215. 1981. SFA 26(4)
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81-002671 Tarby, M. J. METABOLIC EXPENDITURE OF WALLEYE (*STIZOSTEDION VITREUM VITREUM*) AS DETERMINED BY RATE OF OXYGEN CONSUMPTION. *Can. J. Zool.* 59(6):882-889. June 1981. In English with French summ. SFA 26(4)
[U.S. Publ. Health Serv. Hosp., Red Lake, MN 56671] Energy expended by walleye (*Stizostedion vitreum vitreum*) for metabolism was assessed by measuring oxygen consumption of different size fish in respirometers under various conditions of temperature, activity, and ration. Standard metabolism was estimated as rate of oxygen consumption of unfed resting fish, and relationships to weight and temperature were expressed by simple and multiple regression equations. Although slopes for simple regressions did not differ significantly from slopes for analogous equations determined previously for walleye in maintenance feeding trials, the intercept or level of metabolism

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PHYSIOLOGY (CONTINUED)

81-002671 CONTINUED for a fish of unit weight at 20°C computed from feeding experiments was over three times greater than that computed by respirometry. Heat increment, which was qualified from the difference in oxygen consumption of resting walleye fed and deprived of food at 20°C, ranged from about 9 to 11% of the energy ingested and appeared independent of ration and fish size. Metabolism for swimming determined as the difference between rate of oxygen consumption of unfed fish resting and swimming one body length per second was calculated to be approximately equal to the energy expended by walleye for standard metabolism.

81-002672 Thorpe, G. J.; M. A. Busch; M. S. Haswell and D. Robertshaw. MEASUREMENT OF PLASMA CATECHOLAMINE CONCENTRATIONS IN RAINBOW TROUT (*SALMO GAIARDNERI*) BY HIGH PRESSURE LIQUID CHROMATOGRAPHY. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:41-44. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. SFA 26(4)

We describe a new method for monitoring plasma catecholamine concentrations in rainbow trout (*Salmo gairdneri*). The technique involves taking repeated blood samples from chronically cannulated fish over extended periods of time and analyzing plasma catecholamine concentrations utilizing high pressure liquid chromatography. The validity and the potential application of the method for evaluating stress in fish is discussed.

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[Ocean Res. Inst., Univ. Tokyo, Minamidai, Nakano-ku, Tokyo 164, Japan]

81-002677 Turner, R. T.; W. W. Dickhoff and A. Gorbman. ESTROGEN BINDING TO HEPATIC NUCLEI OF PACIFIC HAGFISH, *EPTATRETUS STOUTI*. *Gen. Comp. Endocrinol.* 45(1):26-29. Sept. 1981. SFA 26(4)

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81-002678 Ueda, H. and H. Takahashi. EFFECT OF CONTINUOUS LIGHT EXPOSURE ON PITUITARY GONADOTROPHS OF THE LOACH, *MISGURNUS ANGUILLICAUDATUS*. *Bull. Fac. Fish. Hokkaido Univ.* 32(3):107-119. June 1981. SFA 26(4)

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81-002680 van Bohemen, Ch. G. and J. G. D. Lambert. ESTROGEN SYNTHESIS IN RELATION TO ESTRONE, ESTRADIOL, AND VITELLOGENIN PLASMA LEVELS DURING THE REPRODUCTIVE CYCLE OF THE FEMALE RAINBOW TROUT, *SALMO GAIIRDNERI*. *Gen. Comp. Endocrinol.* 45(1):105-114. Sept. 1981. SFA 26(4)

[J.G.D. Lambert: Zool. Lab., Sect. Comp. Endocrinol. State Univ. Utrecht, 8 Padualaan, 3508 TB Utrecht, The Netherlands]

81-002681 van den Hurk, R. and G. A. Slof. A MORPHOLOGICAL AND EXPERIMENTAL STUDY OF GONADAL SEX DIFFERENTIATION IN THE RAINBOW TROUT, *SALMO GAIIRDNERI*. *Cell Tissue Res.* 218(3):487-497. July 1981. SFA 26(4)

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[P. G. W. J. Van Oordt: Zool. Lab., Transitorium III, Padualaan 8, 3508 TB Utrecht, The Netherlands]

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[Dep. Zoophysiol., Univ. Göteborg, Box 250 59, S-400 33 Göteborg, Sweden]

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[Lab. Mar. Biochem., Fac. Agric., Univ. Tokyo, Bunkyo-ku, Tokyo 113, Japan]

81-002685 Whitfield, A. K.; S. J. M. Blaber and D. P. Cyrus. SALINITY RANGES OF SOME SOUTHERN AFRICAN FISH SPECIES OCCURRING IN ESTUARIES. *S. Afr. J. Zool.* 16(3):151-155. 1981. In English with Afrikaans summ. SFA 26(4)

[Inst. Freshwater Stud., Swartvlei Proj., P.O. Box 49, Sedgfield 6573, South Africa] The recorded salinity ranges of 96 fish species occurring in southern African estuaries are documented. Factors influencing the tolerance of fishes to low and high salinity regimes are discussed, with most species tolerant of low rather than high salinity conditions. This is important since most systems are subject to periodic freshwater flooding, especially during summer. The penetration of freshwater teleosts and elasmobranchs into estuaries is examined and the occurrence of marine fishes in rivers documented. Mortalities arising from salinity extremes in southern African estuaries are discussed, with temperature a key factor initiating such fish kills. Only eight fish species have been recorded spawning in estuaries although the fry of many species are attracted to estuarine waters. It is concluded that a small percentage of southern African fishes have succeeded in utilizing estuaries and this may be attributed to the paucity of strong osmoregulators.

81-002686 Whitt, G. S. and J. P. Wourms, (Organizers). DEVELOPMENTAL DEVELOPMENTAL BIOLOGY OF FISHES. *Am. Zool.* 21(2):317-604. 1981. SFA 26(4)

A collection of papers.--RS

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81-002687 Woodhead, A. D. PENETRATION AND DISTRIBUTION OF CARBON PARTICLES IN A TELEOST FISH, *POECILIA FORMOSA* (GIRARD), THE AMAZON MOLLY. *J. Fish Biol.* 19(2):237-242. Aug. 1981. SFA 26(4)

[Biol. Dep., Brookhaven Natl. Lab., Upton, Long Island, NY 11970] The present paper gives data on the tissue distribution of carbon particles in Amazon mollies exposed for periods of 24-120 h to a 0.05% suspension. Very little carbon penetrated the body, either by way of the intestine or the gills. The little amount that entered appeared to pass almost exclusively through the posterior intestine. There was no anatomical specialization of the cells in this area equivalent to Peyer's patches in the intestine of mammals. We suggest that the uptake in the posterior intestine is related to its greater surface area and possibly to some enhanced mobility. After intraperitoneal (ip) injection, carbon that entered the body accumulated at three sites: the heart, the mesentery and, especially, in the head kidney. By 120 h large accumulations were seen in the intubular areas of the kidney; there was no evidence of excretion of carbon particles from these areas.

81-002688 Yamamoto, K.; Y. Itazawa and H. Kobayashi. GAS EXCHANGE IN THE GILLS OF YELLOWTAIL, *SERIOLOA QUINQUERADIATA* UNDER RESTING AND NORMOXIC CONDITION. *Bull. Jpn. Soc. Sci. Fish.* 47(4):447-451. Apr. 1981. SFA 26(4)

[Ono Limnol. Stn., Shimonoseki Univ. Fish., Ono, Ube 754-13, Japan]

81-002689 Yamane, S. SEXUAL DIFFERENCE IN ULTRASTRUCTURE OF THE ULTIMOBRANCHIAL GLAND OF MATURE EELS (*ANGUILLA JAPONICA*). *Bull. Fac. Fish. Hokkaido Univ.* 32(1):1-5. Mar. 1981. SFA 26(4)

[Chem. Biotest. Cent., Chem. Inspect. Test. Inst., 19014, Chuo-cho, Kurume, Fukuoka 830, Japan]

81-002690 Zacccone, G. and P. Lo Cascio. GLYCOPROTEIN, LIPID AND ENZYME HISTOCHEMISTRY IN THE EPIDERMIS OF THE CLEAVER WRASSE TELEOST *Xyrichtys novacula* (LINNAEUS, 1758) (LABRIDAE, PISCES). *Arch. Biol.* 92(1):73-94. 1981. In English with French summ. SFA 26(4)

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81-002691 Zaugg, W. S. ADVANCED PHOTOPERIOD AND WATER TEMPERATURE EFFECTS ON GILL Na^+-K^+ ADENOSINE TRIPHOSPHATASE ACTIVITY AND MIGRATION OF JUVENILE STEELHEAD (*SALMO GAIARDNERI*). *Can. J. Fish Aquatic Sci.* 38(7):758-764. July 1981. In English with French summ. SFA 26(4)

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81-002692 Zelnik, P. R. and G. Goldspink. THE EFFECT OF EXERCISE ON PLASMA CORTISOL AND BLOOD SUGAR LEVELS IN THE RAINBOW TROUT, *SALMO GAIARDNERII* RICHARDSON. *J. Fish Biol.* 19(1):37-43. July 1981. SFA 26(4)

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GENETICS, VARIATION STUDIES AND HYBRIDIZATION

81-002693 Bao, I. Y. THE GENETIC AND ENDOCRINE CONTROL OF SEXUAL MATURATION AND STERILITY IN HYBRIDS BETWEEN *XIPHOPHORUS HELLERI* AND *X. MACULATUS*. Ph.D. dissertation, N.Y. Univ. 109p. 1980. From Diss. Abstr. Int. B Sci. Eng. 42(2):465. Aug. 1981. SFA 26(4)

81-002694 Busack, C. A. and G. A. E. Gall. INTROGRESSIVE HYBRIDIZATION IN POPULATIONS OF PAIUTE CUTTHROAT TROUT (*SALMO CLARKI SELENIRIS*). *Can. J. Fish. Aquatic Sci.* 38(8):939-951. Aug. 1981. In English with French summ.

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[TINRO, Vladivostok, USSR]

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81-002697 Crandall, P. S. and P. P. Durocher. COMPARISON OF GROWTH RATES, SEX RATIOS, REPRODUCTIVE SUCCESS AND CATCHABILITY OF THREE SUNFISH HYBRIDS. *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 2:88-104. 1979(1980). SFA 26(4)

[Tex. Parks Wildl. Dep., Ingram 78025] Hybrid sunfish, male bluegill (*Lepomis macrochirus purpureus*) x female green (*Lepomis cyanellus*), male bluegill x female redear (*Lepomis microlophus*), and male green x female redear were stocked in ponds and their growth, sex ratios, reproductive success, and catchability compared. Bluegill x green and green x redear hybrids exhibited the fastest growth with bluegill x green showing the best overall growth and condition. All three hybrids were predominantly males. Reproduction occurred, but appeared to be less than that of parent species. Bluegill x green hybrids were the easiest to catch on baits tested.

81-002698 de Almeida Toledo, L. F.; F. Foresti and S. de Almeida Toledo. CONSTITUTIVE HETEROCHROMATIN AND NUCLEOLUS ORGANIZER REGION IN THE KNIFEFISH, *APTERONOTUS ALBIFRONS* (PISCES, APTERONOTIDAE). *Experientia (Basel)* 37(9):953-954. 15 Sept. 1981. SFA 26(4)

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[104 Westcliffe Ave., Pointe Claire, PQ H9R 1M6, Canada]

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[U.S. Fish Wildl. Serv., Willow Beach Natl. Fish Hatchery, P.O. Box 757, Boulder City, NV 89005]

81-002702 Harvey, W. D.; I. F. Greenbaum and R. L. Noble. ELECTROPHORETIC EVALUATION OF FIVE HATCHERY STOCKS OF LARGEMOUTH BASS IN TEXAS. *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 3:49-63. 1980(1981). SFA 26(4)

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GENETICS, VARIATION STUDIES AND HYBRIDIZATION (CONTINUED)

81-002702 CONTINUED

[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843] Results of an electrophoretic study of two stocks of northern largemouth bass and three stocks of Florida largemouth bass currently being maintained at four different Texas hatcheries suggest that intergradation readily occurs when subspecies are maintained simultaneously at a facility. Examination of liver isocitrate dehydrogenase, glutamate oxalate transaminase, and tetrazolium oxidase allozyme banding patterns revealed significant intergradation in four of these five stocks. Intergradation in Florida largemouth bass stocks may occur after importation. Improved hatchery subspecies segregation procedures are needed.

81-002703 Johnson, J.H. and N. H. Ringler. NATURAL HYBRIDIZATION OF *ONCORHYNCHUS KISUTCH* AND *O. TSHAWYTSCHA* IN A LAKE ONTARIO TRIBUTARY, WITH NOTES ON MERISTIC VARIATION. *Copeia* 1981(3):720-721. 26 Aug. 1981. SFA 26(4)
[N.Y. Dep. Environ. Conserv., 50 Wolf Rd., Albany 12233]

81-002704 Kosaka, M. [MORPHOLOGICAL STUDY OF HYBRID FLATFISH: *KAREIUS BICOLORATUS* X *PLATICHTHYS STELLATUS*, IN SENDAI BAY.] *J. Sch. Mar. Sci. Technol. Tokai Univ.* No. 13. p. 161-166. 1980. In Japanese with English summ. SFA 26(4)

81-002705 Lincoln, R. F. SEXUAL MATURATION IN TRIPLOID MALE PLAICE (*PLEURONECTES PLATESSA*) AND PLAICE X FLOUNDER (*PLATICHTHYS FLESUS*) HYBRIDS. *J. Fish Biol.* 19(4):415-426. Oct. 1981. SFA 26(4)
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[Fac. Seas Fish. Res. Lab., 1000 Ordo, Shimizu 424, Japan] Allelic frequencies of fourteen polymorphic loci were compared among collections of chum salmon from eleven populations returning to North American rivers in Alaska (U.S.A.) and British Columbia (Canada). Allelic frequencies were similar among collections within the major areas of western Alaska, central Alaska and British Columbia but differed among the major areas. The similarity of allelic frequencies between the summer and fall runs of the Yukon River and among populations of different tributaries of the Fraser River suggested a substantial amount of intermingling among populations within a particular river system.

81-002707 Patro, R. and R. Prasad. CHROMOSOMAL STUDIES IN FIVE INDIAN FLATFISHES. *Copeia* 1981(2):498-503. May 1981. SFA 26(4)
[P.G. Dep. Zool., Berhampur Univ., Berhampur-760007, Orissa, India]

81-002708 Pontier, P. J. and N. H. Hart. DEVELOPMENTAL EXPRESSION OF GLUCOSE AND TRIOSE PHOSPHATE ISOMERASE GENES IN TELEOST FISHES (*BRACHYDANIO*). *J. Exp. Zool.* 217(1):53-71. July 1981. SFA 26(4)
[Univ. Tex. Med. Br., Galveston 77550]

81-002709 Ross, M. R. and T. M. Cavender. MORPHOLOGICAL ANALYSES OF FOUR EXPERIMENTAL INTERGENERIC CYPRINID HYBRID CROSSES. *Copeia* 1981(2):377-387. May 1981. SFA 26(4)
[Dep. For. Wildl. Manage., Univ. Mass., Amherst 01003]

81-002710 Shaklee, J. B. and G. S. Whitt. LACTATE DEHYDROGENASE ISOZYMES OF GADIFORM FISHES: DIVERGENT PATTERNS OF GENE EXPRESSION INDICATE A HETEROGENEOUS TAXON. *Copeia* 1981(3):563-578. 26 Aug. 1981. SFA 26(4)
[CSIRO Div. Fish., P.O. Box 120, Cleveland, Queensland 463, Australia]

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81-002712 Sorensen, P. Y. AN ANALYSIS OF HYBRIDIZATION AND INTROGRESSION BETWEEN THE CYPRINID FISHES *NOTROPIS LUTRENSIS* AND *N. VENUSTUS* (SUBGENUS *CYPRINELLA*) IN BAYOU PIERRE, MISSISSIPPI. Ph.D. dissertation, Tulane Univ. 157p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(3):896. Sept. 1981. SFA 26(4)

81-002713 Stevenson, M. M. KARYOMORPHOLOGY OF SEVERAL SPECIES OF *CYPRINODON*. *Copeia* 1981(2):494-498. May 1981. SFA 26(4)
[Dep. Biol. Sci., Univ. New Orleans, New Orleans, LA 70122]

81-002714 Taniguchi, N.; R. Hamada and H. Fujiwara. GENETIC DIFFERENCE IN GROWTH BETWEEN FULL-SIB GROUPS OF A MATERNAL HALF-SIB FAMILY OBSERVED IN THE JUVENILE STAGE OF RED SEABREAM AND NIBE-CROAKER. *Bull. Jpn. Soc. Sci. Fish.* 47(6):731-734. June 1981. SFA 26(4)

[Dep. Cult. Fish., Fac. Agric., Kochi Univ., Nankoku, Kochi 783, Japan] A half-sib family consisting of two full-sib groups was prepared using the spawners of red seabream and nibe-croaker to examine the genetic variability in growth of juvenile stage. Each full-sib group was marked by electrophoretic genetic markers. In order to eliminate the environmental deviation from the difference in growth between full-sib groups, each half-sib family was reared in the same tank consistently for 45 days in the case of red seabream and 60 days in the case of nibe-croaker respectively. The percentage deviation between full-sib groups was 10.5% in total length and 32.1% in body weight in nibe-croaker, and 7.0% in total length and 23.8% in body weight in red seabream. The degree of these differences reach the significant level. The values of heritability of body length and body weight in a half-sib family were remarkably high.

81-002715 Thorgaard, G. H.; M. E. Jazwin and A. R. Stier. POLYPLOIDY INDUCED BY HEAT SHOCK IN RAINBOW TROUT. *Trans. Am. Fish. Soc.* 110(4):546-550. July 1981. SFA 26(4)
[Prog. Genet. Cell Biol., Wash. State Univ., Pullman 99164]

81-002716 Uwā, H.; T. Iwamatsu and Y. Ojima. KARYOTYPE AND BANDING ANALYSES OF *ORYZIAS CELEBENSIS* (ORYZIATIDAE, PISCES) IN CULTURED CELLS. *Proc. Jpn. Acad. Ser. B Phys. Biol. Sci.* 52(3):95-99. Mar. 1981. SFA 26(4)
[Dep. Biol., Fac. Sci., Shinshu Univ., Matsumoto, 390 Japan]

81-002717 Vasil'yev, V. P. CHROMOSOME NUMBERS IN FISH-LIKE VERTEBRATES AND FISH. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(3):1-38. 1980. SFA 26(4)
[A.N. Severtsov Inst. Evol. Morphol. Anim. Ecol., USSR Acad. Sci., Moscow, USSR] The numbers of chromosomes and chromosomal arms are presented for 1076 species, subspecies and forms of fish-like vertebrates and fish with an indication of polymorphism and interpopulation differences. Data obtained by old and new methods are presented separately.

GENETICS, VARIATION STUDIES AND HYBRIDIZATION (CONTINUED)

81-002718 Wells, A. W. POSSIBLE OCCURRENCE OF HYBRIDIZATION BETWEEN *COUESIUS PLUMBEUS* AND *SEMOTILUS MARGARITA*. *Copeia* 1981(2):487-489. May 1981. SFA 26(4)
[Ichthological Assoc., Inc., 100 South Cass St., Middletown, DE 19709]

81-002719 Wolters, W. R.; C. L. Chrisman and G. S. Libey. LYMPHOCYTE CULTURE FOR CHROMOSOMAL ANALYSES OF CHANNEL CATFISH, *ICTALURUS PUNCTATUS*. *Copeia* 1981(2):503-504. May 1981. SFA 26(4)
[Dep. For. Nat. Resour., Purdue Univ., West Lafayette, IN 47097]

81-002720 Yabu, H. and K. Ishii. CHROMOSOMES IN PACIFIC SAURY, *COLOLABIS SAIRA*. *Bull. Jpn. Soc. Sci. Fish.* 47(4):559. Apr. 1981. SFA 26(4)
[Fac. Fish., Hokkaido Univ., Minato, Hakodate 041, Japan]

81-002721 Yamazaki, F.; H. Onozato and K. Arai. THE CHOPPING METHOD FOR OBTAINING PERMANENT CHROMOSOME PREPARATION FROM EMBRYOS OF TELEOST FISHES. *Bull. Jpn. Soc. Sci. Fish.* 47(7):963. July 1981. SFA 26(4)
[Lab. Embryol. Genet., Fac. Fish., Hokkaido Univ., Hokodate 041, Japan]

BEHAVIOR

81-002722 Anthony, P. D. VISUAL CONTRAST THRESHOLDS IN THE COD *GADUS MORHUA* L. *J. Fish Biol.* 19(1):87-103. July 1981. SFA 26(4)
[Dep. Agric. Fish. Scotland, Mar. Lab., P.O. Box 101, Aberdeen AB9 8DB, Scotland]

81-002723 Barnett, C. G. THE DEVELOPMENT OF CHEMICAL COMMUNICATION IN CICHLID FISH. *Ph.D. dissertation, Univ. Calif. (Berkeley)* 80p. 1980. From Diss. Abstr. Int. B Sci. Eng. 42(1):97. July 1981. SFA 26(4)

81-002724 Bechler, D. L. THE EVOLUTION OF AGONISTIC BEHAVIOR IN AMBLYOPSID FISHES. *Ph.D. dissertation, St. Louis Univ.* 168p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(4):1347. Oct. 1981. SFA 26(4)

81-002725 Brannon, E. L.; T. P. Quinn; G. L. Lucchetti and B. D. Ross. COMPASS ORIENTATION OF SOCKEYE SALMON FRY FROM A COMPLEX RIVER SYSTEM. *Can. J. Zool.* 59(8):1548-1553. Aug. 1981. In English with French summ. SFA 26(4)
[Coll. Fish., Univ. Wash., Seattle 98195]

81-002726 Carey, F. G. and B. H. Robison. DAILY PATTERNS IN THE ACTIVITIES OF SWORDFISH, *XIPHIAS GLADIUS*, OBSERVED BY ACOUSTIC TELEMETRY. *NOAA Fish. Bull.* 79(2):277-292. Apr. 1981. SFA 26(4)
[Woods Hole Oceanogr. Inst., Woods Hole, MA 02543]

81-002727 Carey, W. E. and D. L. G. Noakes. DEVELOPMENT OF PHOTOBEHAVIOURAL RESPONSES IN YOUNG RAINBOW TROUT, *SALMO GAIARDNERI* RICHARDSON. *J. Fish Biol.* 19(3):285-296. Sept. 1981. SFA 26(4)
[Dep. Zool., Coll. Biol. Sci., Univ. Guelph, Guelph, ON N1G 2W1, Canada] The photobehaviour of young rainbow trout was studied from the time of hatching to completed emergence using an artificial turf substrate incubation system. At all light energies tested, free-embryos initiated a substantial downward movement and rates of fish descent did not appear to reflect the order of light energy levels. A nocturnal activity rhythm was established early in the downward phase. The occurrence of a rapid photoresponse shift 21 days after hatching coincided with the synchronous onset of emergence in all fish groups and the depletion of 85% (by volume) of the yolk reserve.

BEHAVIOR (CONTINUED)

81-002727 CONTINUED Concurrent morphological observations indicated that the photoresponse change occurred when fish were about 25 mm long, and when paired and median fins were fully developed.*

81-002728 Carlson, H. R. and R. R. Straty. HABITAT AND NURSERY GROUNDS OF PACIFIC ROCKFISH, *SEBASTES* SPP., IN ROCKY COASTAL AREAS OF SOUTHEASTERN ALASKA. *Mar. Fish. Rev.* 43(7):13-19. July 1981. SFA 26(4)

[NMFS, P.O. Box 155, Auke Bay, AK 99821] During late July 1978 we used a small submarine to explore the rugged rocky substrate along the coast of southeastern Alaska to depths of nearly 240 m (130 fathoms). The extensive boulder fields and pinnacle-studded bottom were populated mostly by rockfish, *Sebastes* spp., of several species and a wide range of sizes. This untrawlable zone is a nursery area for rockfish, and dense schools of thousands of small 6-8 cm (2.5-3 inch) red rockfish were sighted at 90-100 m (49-55 fathom) depths over crevices and cover. Fish were less abundant in similar surveys of protected waters of a bay and fiord adjacent to the coastal sites.

81-002729 Couvillon, P. A. and M. E. Bitterman. ANALYSIS OF ALTERATION PATTERNING IN GOLDFISH. *Anim. Learn. Behav.* 9(2):169-172. May 1981. SFA 26(4)
[Univ. Hawaii, Honolulu 96822]

81-002730 Cross, J. N. STRUCTURE OF A ROCKY INTERTIDAL FISH ASSEMBLAGE. *Ph. D. dissertation, Univ. Wash.* 275p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(1):51. July 1981. SFA 26(4)

81-002731 Darkov, A. A. and A. D. Mochek. CLEANING SYMBIOSIS IN BLACK SEA FISHES. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):152-155. 1980. SFA 26(4)

[IMEZzh, Moscow, USSR]

81-002732 Driscoll, J. W. and P. R. Welanko. DOMINANCE RELATIONSHIPS IN FEMALE *HEROTILAPIA MULTISPINOSA* (PISCES: CICHLIDAE). *Anim. Learn. Behav.* 9(2):164-168. May 1981. SFA 26(4)

[Univ. Colo., Denver 80202]

81-002733 Emery, A. R. and M. Labelle. UNDERWATER OBSERVATIONS ON A RARE CARIBBEAN FISH, *LABRISOMUS FILAMENTOSUS* (LABRISOMIDAE) IN BARBADOS, W.I. *Can. J. Zool.* 59(8):1625-1629. Aug. 1981. In English with French summ. SFA 26(4)

[Royal Ontario Mus., Toronto, ON M5S 2C6, Canada]

81-002734 Fine, M. L. FREQUENCY RESPONSES OF THE TOADFISH SWIMBLADDER. *Va. J. Sci.* 32(3):92. 1981. Abstract only. SFA 26(4)

[Dep. Biol., Va. Commonwealth Univ., Richmond 23284]

81-002735 Furukawa, T. EFFECTS OF EFFERENT STIMULATION ON THE SACCULE OF GOLDFISH. *J. Physiol. (Lond.)* 315:203-215. June 1981. SFA 26(4)

[Dep. Physiol., Yushima, Bunkyo-ku, Tokyo 113, Japan]

81-002736 Hashimoto, S. [STUDIES ON THE METABOLIC FUNCTION OF ADULT CHUM SALMON, *ONCORHYNCHUS KETA* (WALBAUM)-IV. ANALYSIS OF ADULT CHUM SALMON'S BEHAVIOR AND ACTIVITY MEASURED BY OXYGEN METER IN THE STOCKING POND.] *Sci. Rep. Hokkaido Salmon Hatchery* No. 35. p. 1-8. Mar. 1981. In Japanese with English summ. SFA 26(4)

[Hokkaido Salmon Hatchery, Nakanoshima, Toyohiraku, Sapporo, Hokkaido, Japan]

BEHAVIOR (CONTINUED)

81-002737 Helfman, G. S. THE ADVANTAGE OF FISHES OF HOVERING IN SHADE. *Copeia* 1981(2):392-400. May 1981. SFA 26(4)

[Zool. Dep., Univ. Ga., Athens 30602] Temperate lake fishes are attracted to the shade produced by floating objects. Mechanisms underlying this attraction were investigated by measuring the relative visibility of a target both under and away from the shade of a float. During most conditions, a shaded observer could see objects farther away than could an unshaded observer. Importantly, a shaded observer could see a sunlit target at more than 2.5 times the distance at which a sunlit observer could see a shaded target. This relative visual advantage may result from two interacting visual phenomena: 1) the increment threshold response, whereby a sunlit viewer has a raised contrast perception threshold and therefore has difficulty responding to a shaded target; and 2) the veiling brightness effect, whereby particles between sunlit observer and shaded target scatter relatively bright light into the observer's eyes, further reducing the target's visual contrast. Shade-producing objects may attract fishes because the objects function to reduce both background light and veiling brightness. A fish hovering in shade is better able to see approaching objects and is simultaneously more difficult to see.

81-002738 Hixon, M. A. AN EXPERIMENTAL ANALYSIS OF TERRITORIALITY IN THE CALIFORNIA REEF FISH *EMBIOTOCA JACKSONII* (EMBIOTOCIDAE). *Copeia* 1981(3):653-665. 26 Aug. 1981. SFA 26(4)

[Dep. Zool., Univ. Hawaii, Honolulu 96822]

81-002739 Huntingford, F. A. FURTHER EVIDENCE FOR AN ASSOCIATION BETWEEN LATERAL SCUTE NUMBER AND AGGRESSIVENESS IN THE THREESPINE STICKELBACK, *CASTEROSTEUS ACULEATUS*. *Copeia* 1981(3):717-720. 26 Aug. 1981. SFA 26(4)

[Dep. Zool., The University, Glasgow G12 8QQ, Scotland]

81-002740 Itzkowitz, M. THE RELATIONSHIPS OF INTRUSIONS AND ATTACKS TO TERRITORY SIZE AND QUALITY IN THE PUFFFISH, *CYPRINODON VARIEGATUS* LACE PÉDE. *Biol. Behav.* 6(3):273-280. 1981. In English with French summ. SFA 26(4)

[Dep. Biol., Lehigh Univ., Bethlehem, PA 18015]

81-002741 Jobling, M. TEMPERATURE TOLERANCE AND THE FINAL PREFERENDUM--RAPID METHODS FOR THE ASSESSMENT OF OPTIMUM GROWTH TEMPERATURES. *J. Fish Biol.* 19(4):439-455. Oct. 1981. SFA 26(4)

[Inst. Fisker., Univ. Tromsø, 9001 Tromsø, Norway]

81-002742 Karplus, I. and D. Algom. VISUAL CUE FOR PREDATOR FACE RECOGNITION BY REEF FISHES. *J. Comp. Ethol.* 55(4):343-364. 1981. SFA 26(4)

[Div. Biol. Living Resour., Univ. Miami, 4600 Rickenbacker Causeway, Miami, FL 33149] A morphometric analysis of 20 different facial features of reef fishes was carried out in order to assess cues which could serve for predator recognition. 105 different species of 35 different families were included in this study. The main features of potential discriminatory value were head width, head shape, the size of the mouth and its shape, the shape of the eyes, their diameter, and the distance between the eyes. Color and pattern were of no potential discriminatory value. Discriminant function analysis showed that two cues, the distance between the eyes and the size of the mouth, were sufficient for good predator recognition. The camouflage of piscivorous cues by predatory fish is discussed. The mimicry of piscivorous cues by some prey fishes as an anti-predator strategy is suggested for two types of false eye spots simulating the frontal aspect of a piscivore.

BEHAVIOR (CONTINUED)

81-002743 Katzir, G. VISUAL ASPECTS OF SPECIES RECOGNITION IN THE DAMSELFISH *DASCYLLUS ARUANUS* L. (PISCES, POMACENTRIDAE). *Anim. Behav.* 29(3):842-849. Aug. 1981. SFA 26(4)

[Dep. Biol., Ben Gurion Univ., Beer Sheva, Israel] Attraction was found to a reliable indicator of species recognition in the damselfish *Dascyllus aruanus*. Isolated fish are attracted to live or dead conspecifics significantly more than to heterospecifics. Attraction persists towards black and white photographs. Using photographs it was shown that certain parts of the pattern are more important for recognition than others. Of the three black bars of the normal colour pattern, the central is the most important, and the anterior the least so. Two alternative criteria for demonstrating species recognition in a boldly coloured reef fish, aggression and attraction, are contrasted.

81-002744 Kawamura, G.; A. Shibata and T. Yonemori. RESPONSE OF TELEOSTS TO THE PLANE OF POLARIZED LIGHT AS DETERMINED BY THE HEART BEAT RATE. *Bull. Jpn. Soc. Sci. Fish.* 47(6):727-729. June 1981. SFA 26(4)

[Fac. Fish., Kagoshima 890, Japan]

81-002745 Kawamura, G.; W. Nishimura; S. Ueda and T. Nishi. COLOR VISION AND SPECTRAL SENSITIVITY IN TUNAS AND MARLINS. *Bull. Jpn. Soc. Sci. Fish.* 47(4):481-485. Apr. 1981. SFA 26(4)

[Lab. Fish. Technol., Fac. Fish., Kagoshima Univ., Kagoshima 890, Japan]

81-002746 Klimley, A. P. and D. R. Nelson. SCHOOLING OF THE SCALLOPED HAMMERHEAD SHARK, *SPHYRNA LEWINI*, IN THE GULF OF CALIFORNIA. *NOAA Fish. Bull.* 79(2):356-360. Apr. 1981. SFA 26(4)

[Grad. Dep., A-008, Scripps Inst. Oceanogr., La Jolla, CA 92093]

81-002747 Kotlyar, A. N. THE BIOLOGY OF "ARMLESS" FLOUNDERS (BOTHIDAE) FROM THE SOUTHWESTERN ATLANTIC OCEAN. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):143-147. 1980. SFA 26(4)

[VNIRO, Moscow, USSR]

81-002748 Kozlovskiy, S. V. THE DISTRIBUTION OF THE "COMMON CASPIAN KILKA", *CLUPONELLA DELICATULA CASPIA*, OF KUYBYSHEV RESERVOIR. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(3):152-157. 1980. SFA 26(4)

[Kuybyshev Stn., Inst. Biol. Inland Waters, USSR Acad. Sci., Tol'yatti, USSR]

81-002749 Little, E. E. CONDITIONED CARDIAC RESPONSE TO THE OLFACTORY STIMULI OF AMINO ACIDS IN THE CHANNEL CATFISH, *ICTALURUS PUNCTATUS*. *Physiol. Behav.* 27(4):691-697. Oct. 1981. SFA 26(4)

[Columbia Natl. Fish. Res. Lab., Rt. 1, Columbia, MO 65201]

81-002750 Meffe, G. K. and R. C. Vrijenhoek. STARVATION STRESS AND INTRAOVARIAN CANNIBALISM IN LIVEBEARERS (ATHERINIFORMES: POECILIIDAE). *Copeia* 1981(3):702-705. 26 Aug. 1981. SFA 26(4)

[Dep. Zool., Ariz. State Univ., Tempe 85281]

81-002751 Montgomery, W. L. MIXED-SPECIES SCHOOLS AND THE SIGNIFICANCE OF VERTICAL TERRITORIES OF DAMSELFISHES. *Copeia* 1981(2):477-481. May 1981. SFA 26(4)

[Woods Hole Oceanogr. Inst., Woods Hole, MA 02543]

81-002752 Ogilvy, C. S. and A. B. Dubois. THE HYDRODYNAMIC DRAG OF SWIMMING BLUEFISH (*POMATOMUS SALTATRIX*) IN DIFFERENT INTENSITIES OF TURBULENCE: VARIATION WITH CHANGES OF BUOYANCY. *J. Exp. Biol.* 92:67-85.

BEHAVIOR (CONTINUED)

81-002752 CONTINUED June 1981. SFA 26(4)

[J. B. Pierce Found. Lab., 290 Congress Ave., New Haven, CT 06519]

81-002753 Pressley, P. H. PAIR FORMATION AND JOINT TERRITORIALITY IN A SIMULTANEOUS HERMAPHRODITE: THE CORAL REEF FISH *SERRANUS TIGRINUS*. *J. Comp. Ethol.* 56(1):33-46. 1981. In English with German summ. SFA 26(4)[Dep. Zool., Univ. Calif., Berkeley 94720] Marked individuals of the Caribbean reef fish *Serranus tigrinus* were studied to examine the social and mating systems of these hermaphrodite serranids. Removal experiments indicated that adults formed long-lasting pairs that jointly defended territories. Within these territories pair members appeared to forage cooperatively. At sunset pair members usually alternated spawning roles. Potential advantages of pair formation and factors influencing the maintenance of simultaneous hermaphroditism are discussed.81-002754 Reis, R. R. and J. M. Dean. TEMPORAL VARIATION IN THE UTILIZATION OF AN INTERTIDAL CREEK BY THE BAY ANCHOVY (*ANCHOA MITCHILLI*). *Estuaries* 4(1):16-23. Mar. 1981. SFA 26(4)

[Dep. Biol., Univ. S.C., Columbia 29208]

81-002755 Reynolds, W. W. and M. E. Casterlin. THERMOREGULATORY BEHAVIOR OF THE TRIGGERFISH *BALISTES FUSCUS* IN AN ELECTRONIC SHUTTLEBOX. *Hydrobiologia* 83(2):255-256. 4 Sept. 1981. SFA 26(4)[Mar. Biol. Prog., Univ. New England, Biddeford, ME 04005] Ten blue triggerfish, *Balistes fuscus*, were tested individually for 3 days each in an Ichthyotron electronic shuttleboxes to measure their thermoregulatory behavior. The modal thermal preferendum, a species-specific measure of temperature preference which is independent of prior thermal acclimation, was 25°C. The triggerfish voluntarily occupied a 16-27° C range of temperature, out of a potentially available range of 0-50°C. There was no significant difference in preferred temperature between night and day, indicating lack of a thermoregulatory rhythm in this species. The preferred temperature range of this tropical marine reef species is similar to the that of cool temperate freshwater and marine fishes; many warm temperate species prefer higher temperatures.81-002756 Rubenstein, D. I. INDIVIDUAL VARIATION AND COMPETITION IN THE EVERGLADES PYGMY SUNFISH. *J. Anim. Ecol.* 50(2):337-350. June 1981. SFA 26(4)[Biol. Dep., Princeton Univ., Princeton, NJ 08544] Populations of Everglades pygmy sunfish (*Elassoma evergladei*, family Centrarchidae) were manipulated in both the laboratory and the field to determine how individuals responded to changes in the intensity of competition. In laboratory experiments, individually identifiable fish were raised at different densities (sixteen, eight, four, and one fish per tank) and each individual's competitive ability was measured by its growth rate and reproductive condition. For females, estimates of reproductive potential were ovary weight and egg number. For males, reproductive ability was estimated by recording the frequency of occurrence of bobbing, a sexual behaviour. In field experiments fish were raised at the same densities but in screened enclosures to evaluate the realism of the laboratory experiments. Individual fish differed in their growth rates, and these differences were magnified under competitive conditions. Increased density also increased the variation among females within a population with respect to ovary size and egg number. Increased population density markedly decreased the growth rate of the 'average' fish in the population, but only slightly the growth of the 'best' competitors. In each density there were always some fish who grew as quickly as the 'average' fish of a population half as large. Increases in population size also produced non-linear reductions in estimates of both male and female potential reproductive success. For females these reductions

BEHAVIOR (CONTINUED)

81-002756 CONTINUED could be attributed in part to density-induced reductions in growth rate. But density also had a direct effect on female reproductive success: for females of similar size or growing at a similar rate, those raised at higher densities had larger ovaries and more eggs.

81-002757 Shingleton, M. V.; C. H. Hocutt and J. R. Stauffer, Jr. TEMPERATURE PREFERENCE OF THE NEW RIVER SHINER. *Trans. Am. Fish. Soc.* 110(5):660-661. Sept. 1981. SFA 26(4)

[Appalachian Environ. Lab., Cent. Environ. Estuarine Stud., Univ. Md., Frostburg 21532]

81-002758 Smith, G. W.; A. D. Hawkins; G. G. Urquhart and W. M. Shearer. ORIENTATION AND ENERGETIC EFFICIENCY IN THE OFFSHORE MOVEMENTS OF RETURNING ATLANTIC SALMON *SALMO SALAR* L. *Scott. Fish. Res. Rep.* No. 21. 22p. 1981. SFA 26(4)

[Mar. Lab., Aberdeen, Scotland]

81-002759 Swartz, S. L. CLEANING SYMBIOSIS BETWEEN TOPSMELT, *ATHERINOPS AFFINIS*, AND GRAY WHALE, *ESCHRICHTIUS ROBUSTUS*, IN LAGUNA SAN IGNACIO, BAJA CALIFORNIA SUR, MEXICO. *NOAA Fish. Bull.* 79(2):360. Apr. 1981. SFA 26(4)

* [Cetacean Res. Assoc., 1592 Sunset Cliffs Blvd., San Diego, CA 92107]

81-002760 Tsvetkov, V. I. HYDROSTATIC PECULIARITIES OF THE WHITEFISH, *COREGONUS LAVARETUS*. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):121-127. 1980. SFA 26(4)

[IEMEZh, Moscow, USSR] The hydrostatic peculiarities of the whitefish, *Coregonus lavaretus*, of the White Sea were studied. The buoyancy of the whitefish is variable and changes depending on external pressure, temperature and density. Hydrostatic reactions aimed at producing neutral buoyancy consist in swallowing air from the water surface when buoyancy is inadequate (compression) and releasing excess gas from the swim bladder when it is excessive (decompression). The manifestation of hydrostatic reactions during changes in the temperature and density of water shows the great significance of hydrostatic peculiarities during the downstream migration of the young into the sea, and in particular the possible cause of the concentration of downstream migrating young in places with sharp temperature and salinity gradients.

81-002761 Vasil'kov, V. P.; N. G. Chupysheva and N. G. Kolesova. THE POSSIBILITY OF LONG TERM FORECASTING FROM SOLAR ACTIVITY CYCLES OF CATCHES OF THE SAFFRON COD, *ELEGINUS GRACILIS*, IN THE SEA OF JAPAN. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):26-33. 1980. SFA 26(4)

[TINRO, Vladivostok, USSR] The results of a study of the nature and causes of the rhythm in catches of the saffron cod, *Eleginus gracilis*, off the coast of the Maritime Territory are presented. The links between this rhythm and solar rhythms and fluctuations in hydrologic conditions are shown. A system of approximate longterm forecasting of saffron cod catches, based on the links detected, is presented. The method of mathematical spectral analysis and superposition of epochs was used in the study.

81-002762 Veen, T. van; M. Andersson and D.-E. Nilsson. DIEL RHYTHM IN THE ELVER, *ANGUILLA ANGUILLA*: TESTING A COMPUTERIZED SYSTEM FOR RECORDING BIORHYTHMICS. *Oikos* 37(1):69-72. July 1981. In English with Russian summ. SFA 26(4)

[Dep. Zool., Univ. Lund, Helgonav. 3, S-223 62, Lund, Sweden]

SPORT FISHERY ABSTRACTS

BEHAVIOR (CONTINUED)

81-002763 Webb, P. W. THE EFFECT OF THE BOTTOM ON THE FAST START OF FLATFISH *CITHARICHTHYS STIGMAEUS*. NOAA Fish. Bull. 79(2):271-276. Apr. 1981. SFA 26(4)
[Sch. Nat. Resour., Univ. Mich., Ann Arbor 48109]

81-002764 Weissert, R. and C. von Campenhausen. DISCRIMINATION BETWEEN STATIONARY OBJECTS BY THE BLIND CAVE FISH *ANOPTICHTHYS JORDANI* (CHARACIDAE). J. Comp. Physiol. A Sens. Neural Behav. Physiol. 143(3):375-381. Aug. 1981. SFA 26(4)
[Inst. Zool., Johannes Gutenberg-Univ., Saarstr. 21, D-6500 Mainz, West Germany]

81-002765 Yamagishi, H.; T. Matsushima and M. Nakamura. [NOTE ON THE AGGRESSIVE BEHAVIOUR OF JUVENILE CHUM SALMON *ONCORHYNCHUS KETA* (WALBAUM).] Sci. Rep. Hokkaido Salmon Hatchery No. 35. p. 25-31. Mar. 1981. In Japanese with English summ. SFA 26(4)
[Hokkaido Salmon Hatchery, Nakanoshima, Toyohiraku, Sappora, Hokkaido, Japan]

LIFE HISTORY-GENERAL WORKS

81-002766 Acero P., A. ANOTACIONES ECOLOGICAS Y SISTEMATICAS SOBRE LOS PECES DE LA FAMILIA POMACENTRIDAE EN EL CARIBE COLOMBIANO. [ECOLOGICAL AND SYSTEMATIC NOTES ON THE FISH OF THE FAMILY POMACENTRIDAE IN THE COLOMBIAN CARIBBEAN.] An. Inst. Invest. Mar. Punta Betin 10:249-259. 1978. In Spanish with English summ. SFA 26(4)
[Inst. Invest. Mar. Punta de Bétin, Apt. Aéreo 1016, Santa Marta, Colombia]

81-002767 Bailey, K. M. AN ANALYSIS OF THE SPAWNING, EARLY LIFE HISTORY AND RECRUITMENT OF THE PACIFIC HAKE, *MERLUCCIVUS PRODUCTUS*. Ph.D. dissertation, Univ. Wash. 167p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(4):1347. Oct. 1981. SFA 26(4)

81-002768 Benoit, J. and G. Power. BIOLOGIE DE DEUX POPULATIONS ARCTIQUES DE TOULADI, *SALVELINUS NAMAYCUSH* (WALBAUM), DE LA RÉGION DU LAC MINTO, NOUVEAU-QUEBEC. [BIOLOGY OF TWO ARCTIC POPULATIONS OF LAKE TROUT, *SALVELINUS NAMAYCUSH* (WALBAUM), IN THE LAKE MINTO REGION, NORTHERN QUEBEC.] Nat. Can. (Que.) 108(1):1-16. 1980. In French with English summ. SFA 26(4)
[Serv. Manage. Exploitation Faune, C.P. 156, Shawiningan, PQ G9N 1V9, Canada] The fish communities of two non-exploited lakes in northern Québec are dominated by the lake trout, *Salvelinus namaycush*. This species accounts for 60.5% of the total catch and 83.0% of the sampled biomass. Catch by gill and trap nets was retained for length distribution. Individual ages, based on 1,116 pairs of otoliths, ranged from 0 to 42. Growth in length seems to be the slowest known for this species. Sexual maturation occurs lately, and annual reproduction implies only 35.3% of the adult females. Females carry a mean number of 116 eggs per 100 g of body weight. Feeding is chiefly of piscivorous type, but main preys differ from lake to lake.

81-002769 Burr, B. M. and R. L. Mayden. SYSTEMATICS, DISTRIBUTION AND LIFE HISTORY NOTES ON *NOTROPIS CHIHUAHUA* (PISCES: CYPRINIDAE). Copeia 1981(2):255-265. May 1981. SFA 26(4)
[Dep. Zool., South. Ill. Univ., Carbondale 62901] The poorly known Chihuahua shiner, *Notropis chihuahua*, is redescribed. The species typically occurs in small to medium-sized, gravelly or sandy clear streams

SPORT FISHERY ABSTRACTS

LIFE HISTORY-GENERAL WORKS (CONTINUED)

81-002769 CONTINUED within the Chihuahuan Desert region of northern Mexico and the Big Bend region of Texas. Because of recent modifications occurring in the Chihuahuan Desert the species should be monitored closely to assess its status and ecological requirements. *Notropis chihuahua* is compared to similar-appearing species on the basis of head and body physiognomy, tubercle pattern, coloration and overall similarity in numerous meristic features. *Notropis chihuahua* grows to a maximum of 64 mm SL and lives at least two years. The spawning season is protracted and lasts from March to early August. Females contain 400 to 900 mature ova and the sex ratio varies from 1.6 males: 1 female to 1.3 males: 1 female. Intestinal contents reveal a preference for small aquatic insects; the dominant intestinal parasite is a nematode.

81-002770 Druzhinin, A. D. and Ye. G. Petrova. SOME DATA ON THE ECOLOGY AND GROWTH OF *PSETTODES ERUMEI* (FAMILY PSETTODIDAE ORDER PLEURONECTIFORMES) OF THE GULF OF ADEN. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(3):143-147. 1980. SFA 26(4)
[VNIRO, Moscow, USSR]

81-002771 Getter, C. D. ECOLOGY AND SURVIVAL OF THE KEY SILVERSIDE, *MENIDIA CONCHORUM*, AN ATHERINID FISH ENDEMIC TO THE FLORIDA KEYS. *Ph.D. dissertation, Univ. Miami* 138p. 1981. Diss. Abstr. Int. B Sci. Eng. 42(4):1293. Oct. 1981. SFA 26(4)

The key silverside, *Menidia conchorum*, is studied as an indicator of adaptations to environmental conditions in lagoonal and ponded water habitats of the lower Florida Keys. Evidence is presented to support the current view of ichthyologists that *M. conchorum* is a valid species. It occurs in lagoons from Grassy Key to Key West, Florida. This lagoonal habitat is shared by a distinct community. Such lagoons are characterized by rapid fluctuations and broad ranges of physico-chemical parameters. *M. conchorum* feeds on planktonic crustaceans and terrestrial insects. Maximum size for females is about 58mm (SL) and 50.1 mm for males. Maturation appears to take place at about 40mm. The species appears to live one year or less in nature. Reproduction continues year-round with peaks in fertility in the spring and fall. Its population size is seasonal, with a low point in late summer and fall. Nearly all populations inhabit lagoons altered by man and the species is judged as threatened with extinction.

81-002772 Golovan', G. A. and N. P. Pakhorukov. NEW DATA ON THE ECOLOGY AND MORPHOMETRY OF *ALEPOCEPHALUS ROSTRATUS* (ALEPOCEPHALIDAE). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(3):77-83. 1980. SFA 26(4)
[SEKBPI, Sevastopol, USSR]

81-002773 Goto, A. [LIFE HISTORY AND DISTRIBUTION OF A RIVER SCULPIN, *COTTUS HANGIONGENSIS*.] *Bull. Fac. Fish. Hokkaido Univ.* 32(1):10-21. Mar. 1981. In Japanese with English summ. SFA 26(4)
[Lab. Embryol. Genet., Fac. Fish., Hokkaido Univ., Hokodate, Japan]

81-002774 Krieger, D. A. ECOLOGY OF CATOSTOMIDS IN TWIN LAKES, COLORADO, IN RELATION TO A PUMPED-STORAGE POWER PLANT. *U.S. Dep. Interior Bur. Reclam. REC-ERC-80-2. viii + 47p.* June 1980. SFA 26(4)
[Colo. Coop. Fish. Res. Unit, Colo. State Univ., Fort Collins 80523]

81-002775 Maeda, T.; T. Takahashi and M. Ueno. [ANNUAL LIFE PERIOD OF THE ADULT ALASKA POLLACK IN THE ADJACENT WATERS OF THE FUNKA BAY, HOKKAIDO.] *Bull. Jpn. Soc. Sci. Fish.* 47(6):741-746. June 1981. In Japanese with English summ. SFA 26(4)
[Fac. Fish., Hokkaido Univ., Minato-3, Hakodate 041, Japan]

LIFE HISTORY-GENERAL WORKS (CONTINUED)

81-002776 Minami, T. [THE EARLY LIFE HISTORY OF A SOLE *HETEROMYCTERIS JAPONICUS*.] *Bull. Jpn. Soc. Sci. Fish.* 47(7):857-862. July 1981. In Japanese with English summ. SFA 26(4)

[Dep. Fish, Fac. Agric., Kyoto Univ., Oiwake, Sakyo-ku, Kyoto 606, Japan]

81-002777 Minami, T. [THE EARLY LIFE HISTORY OF A FLOUNDER *PSEUDORHOMBUS PENTOPHTHALMUS*.] *Bull. Jpn. Soc. Sci. Fish.* 47(7):849-856. July 1981. In Japanese with English summ. SFA 26(4)

[Dep. Fish., Fac. Agric., Kyoto Univ., Kyoto 606, Japan]

81-002778 Nsembukya-Katuramu, S.; E. K. Balon and R. Mahon. A COMPARISON OF SPAWNING, HARVESTED, AND DIE-OFF RAINBOW SMELT, *OSMERUS MORDAX*, IN EASTERN LAKE ERIE. *J. Great Lakes Res.* 7(2):144-154. 1981. SFA 26(4)

[E. K. Balon: Zool. Dep., Univ. Guelph, Guelph, ON N1G 2W1, Canada] Rainbow smelt were collected in the area of Long Point, Lake Erie from 1) a commercial trawler, 2) spawning runs in streams, and 3) die-offs along beaches. The parasite *Glugea hertwigi* was found to have no effects on the fecundity or condition of smelt. However, infested smelt grew more slowly than uninfested ones. The percentage of infested smelt in die-offs was not significantly higher than in the spawning stock, suggesting that the parasite was not the primary cause of the mortality. Growth, maximum age, and fecundity of smelt in the samples were lower than in most other smelt populations for which data are available. Since there are no data available for Lake Erie smelt prior to or during the development of the fishery, it is not possible to assess if the observed population structure is the result of exploitation. Sex ratio changes suggest that spawning smelt may remix the harvested stock gradually throughout the summer.

81-002779 Panek, F. M. THE LIFE HISTORY AND ECOLOGY OF THE EASTERN MUDMINNOW (*UMBRA PYGMAEA*) WITH NOTES ON ECOLOGICAL AND ZOOGEOGRAPHIC RELATIONSHIPS TO THE CENTRAL MUDMINNOW (*UMBRA LIMI*). Ph.D. dissertation, Rutgers Univ. 127p. 1981. From Diss. Abstr. Int B Sci. Eng. 42(4):1351. Oct. 1981. SFA 26(4)

Two geographically separated populations of the eastern mudminnow (*Umbra pygmaea*) were studied to: (1) characterize the species life history, (2) evaluate differences in the life history traits relative to the expectations of r- and K-selection, (3) compare life history traits to those of the other species of North American *Umbra*, the central mudminnow (*U. limi*) and (4) draw inferences from these findings relative to the historical geography of the species. The northern study site was restricted to the waters of the Great Swamp National Wildlife Refuge in New Jersey and the southern site to similar habitats in the Croatan National Forest in North Carolina. The southern population was sampled throughout 1976 and the northern population during 1978-79. The species was found to spawn annually, usually from February to April depending upon geographic location. The actual duration of spawning was relatively short; lasting no more than two weeks. Spawning temperatures ranged from 8-12°C. Eggs at spawning averaged 1.4mm in diameter and fecundity was proportional to body length. Relationships of fecundity to body length were significantly different between populations. Reproductive potential was higher in the northern population. Growth was estimated by length-frequency and back-calculation from annuli marks on sacculus otoliths. There was no significant differences in growth rates between study locations. Estimates of survival and mortality were obtained by semi-graphical analysis of catch curves. Annual mortality rates averaged 0.73 in the southern population and 0.59 in the northern population. Seasonal food habits indicated the species was a bottom feeding omnivore with major food resources of detritus, chironomid larvae, cladocerans, and ostracods. Ecological and life history comparisons of the eastern and central mudminnows indicated similarities in habitat preferences, reproductive traits, growth potentials, and feeding biology. Both species were located on the r-selected side of a continuum of fish reproductive strategies. Northern population of eastern mudminnow exhibited more r-selected traits than the southern population. The present ranges of the two species were discussed relative to the fossil record and historical geology. Present distributions of *Umbra* reflect

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LIFE HISTORY-GENERAL WORKS (CONTINUED)

81-002779 CONTINUED major changes brought about by Pleistocene glaciations and the rise of the Appalachians during the Cenozoic. Allopatric speciation of ancestral *Umbra* to *U. limi* of north-central North America and *U. pygmaea* of the Atlantic coastal states probably occurred during the early Pleistocene. The recent speciation may account for their striking similarities.

81-002780 Sewell, S. A.; F. A. Carter and C. T. McAllister. IMPLICATIONS AND CONSIDERATIONS CONCERNING THE STATUS, HABITAT AND DISTRIBUTION OF THE LEAST BROOK LAMPREY, *LAMPETRA AEPYPTERA* (ABBOTT), IN ARKANSAS. *Proc. Arkansas Acad. Sci.* 34:132-133. 1980. SFA 26(4)

[U.S. Soil Conserv. Serv., Water Resour. Staff, 675 U.S. Courthouse, Nashville, TN 37203] Thirty-two verified specimens of *L. aepyptera* from Arkansas were either collected or located by the authors. The continual survival of the species in Arkansas in discussed in light of its larval habitat requirements and the predictable impacts of planned water resource development projects involving channel alteration on these requirements. The implementation of protective measures for the species within its Arkansas range appears warranted.

81-002781 Silva, E. I. L. and S. S. De Silva. ASPECTS OF THE BIOLOGY OF GREY MULLET, *MULGIL CEPHALUS* L., ADULT POPULATIONS OF A COASTAL LAGOON IN SRI LANKA. *J. Fish Biol.* 19(1):1-10. July 1981. SFA 26(4)

[Dep. Zool., Ruhuna Univ. Coll., Matara, Sri Lanka] The biology of grey mullet, *Mugil cephalus* L., adult populations in a coastal lagoon in Sri Lanka is presented. The percentage of grey mullet catches increased with increasing salinity. The larger fish were found in the deeper areas and the relationship of total length of depth was $L=8.4602e^{0.0058D}$ where L =total length and D =depth (cm). The overall female to male ratio was 0.95:1.0 and seasonal variation in the sex ratio is considered to be caused by the differential timing in the spawning migrations of the two sexes. Males mature at 34.0 cm and females at 31.5 cm. The main spawning season was between January and May and it is hypothesized that the breeding season is geared to utilize the favourable time period, for growth of fry, in the lagoon. Grey mullet sheds its eggs in batches. Fecundity varied from 0.45 to 4.2 million in fish ranging in length from 32 to 56 cm and in weight from 0.7 to 2.2 kg. Fecundity was significantly correlated to body length and weight and gonad weight.

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC.

81-002782 Ahrenholz, D. W. RECRUITMENT AND EXPLOITATION OF GULF MENHADEN, *BREVOORTIA PATRONUS*. *NOAA Fish. Bull.* 79(2):325-335. Apr. 1981. SFA 26(4)
[NMFS, Beaufort, NC 28516]

81-002783 Fraidenburg, M. E. FIRST ESTIMATES OF NATURAL MORTALITY FOR YELLOWTAIL ROCKFISH. *Trans. Am. Fish. Soc.* 110(4):551-553. July 1981. SFA 26(4)

[Wash. State Dep. Fish., 115 General Admin. Bldg., Olympia 98504]

81-002784 Grabacki, S. T. EFFECTS OF EXPLOITATION ON THE POPULATION DYNAMICS OF CHENA RIVER GRAYLING. *Proc. Alaska Sci. Conf. (Fairbanks)* 32:94. 1981. Abstract only. SFA 26(4)

[Alaska Coop. Fish. Res. Unit, Univ. Alaska, Fairbanks 99701]

SPORT FISHERY ABSTRACTS

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

- 81-002785 Hatch, R. W.; P. M. Haack and E. H. Brown, Jr. ESTIMATION OF ALEWIFE BIOMASS IN LAKE MICHIGAN, 1967-1978. *Trans. Am. Fish. Soc.* 110(5):575-584. Sept. 1981. SFA 26(4)
[U.S. FWS, Great Lakes Fish. Lab., Ann Arbor, MI 48105]
- 81-002786 Hayase, S. and S. Tanaka. POPULATION FLUCTUATION OF THREE SPECIES OF EMBIOTOCID FISHES IN THE *ZOSTERA MARINA* BELT OF ODAWA BAY. *Bull. Jpn. Soc. Sci. Fish.* 47(6):713-717. June 1981. SFA 26(4)
[Ocean Res. Inst., Univ. Tokyo, Nakano, Toyko 0164, Japan]
- 81-002787 Jilek, R. POPULATION STABILITY IN THE GIZZARD SHAD POPULATION OF CRAB ORCHARD LAKE, ILLINOIS. *Trans. Ill. State Acad. Sci.* 73(4):45-47. 1980. SFA 26(4)
[Dep. Zool., Ohio State Univ., Columbus] A 25 year reanalysis of the gizzard shad, *Dorosoma cepedianum* (LeSueur), population in Crab Orchard Lake, Illinois, was conducted for the purposes for comparison. The gizzard shad population has remained relatively stable in regard to age composition, however, the condition of the fish has dramatically declined. Coefficient of condition appears highest from May through September. Females exhibit higher K values than males.
- 81-002788 Knight, R. L. ENERGY BASIS OF CONTROL IN AQUATIC ECOSYSTEMS. *Ph.D. dissertation, Univ. Fla.* 219p. 1980. From Diss. Abstr. Int. B. Sci. Eng. 42(2):490. Aug. 1981. SFA 26(4)
The results of these studies with a single toxin and a few consumer organisms are predicted to be general to controllers in other systems. Tables of embodied energy values for controllers and their resulting energy effect may be useful to environmental engineers in the wise management of ecosystems.--From abstr.
- 81-002789 Marinac-Sanders, P. and D. W. Coble. THE SMALLMOUTH BASS POPULATION AND FISHERY IN A NORTHERN WISCONSIN LAKE, WITH IMPLICATIONS FOR OTHER WATERS. *N. Am. J. Fish. Manage.* 1(1):15-20. 1981. SFA 26(4)
[RR #1, Box 228, Fremont, WI 54940]
- 81-002790 Moring, J. R. SEASONAL CHANGES IN A POPULATION OF THE FLUFFY SCULPIN, *OLIGOCOTTUS SNYDERI*, FROM TRINIDAD BAY, CALIFORNIA. *Calif. Fish Game* 67(4):250-253. Oct. 1981. SFA 26(4)
[Me. Coop. Fish. Res. Unit, Dep. Zool., Univ. Me., Orono 04469]
- 81-002791 Mullen, R. E. ESTIMATES OF THE HISTORICAL ABUNDANCE OF COHO SALMON *ONCORHYNCHUS KISUTCH* (WALBAUM), IN OREGON COASTAL STREAMS AND IN THE OREGON PRODUCTION INDEX AREA. *Oreg. Dep. Fish Wildl. Fish Div. Inf. Rep.* no. 81-5. 9p. July 1981. SFA 26(4)
[Oreg. Dep. Fish Wildl., Corvallis]
- 81-002792 Muller, R. G. and R. S. Benda. COMPARISON OF BOTTOM TRAWL STOCK DENSITIES IN THE INNER KAVIRONDO GULF OF LAKE VICTORIA. *J. Fish Biol.* 19(4):399-401. Oct. 1981. SFA 26(4)
[4015 Boulder Ave., Odessa, TX 79761]
- 81-002793 Neilson, J. D. and G. H. Geen. ENUMERATION OF SPAWNING SALMON FROM SPAWNER RESIDENCE TIME AND AERIAL COUNTS. *Trans. Am. Fish. Soc.* 110(4):554-556. July 1981. SFS 26(4)
[Dep. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6, Canada]

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

81-002794 Nesterov, A. A. and M. Ye. Grudtsev. THE QUANTITATIVE DISTRIBUTION OF THE FLYINGFISH OF THE FAMILY EXOCOETIDAE (BELONIFORMES) IN THE TROPICAL ATLANTIC. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtirol.)* 20(3):137-141. 1980. SFA 26(4)

[AtlantNIRO, Kaliningrad, USSR] The quantitative distribution of flyingfish corresponds closely to the distribution of the areas of increased productivity of the ocean. The maximum biomass of flyingfish 910 kg/km² is found in the zone of coastal upwelling off the Cape Verde Islands. In regions under the influence of the river discharge, the biomass of flyingfish reached 67 kg/km², it was still greater in the zone of the west to east transfer of waters in sections of oceanic upwelling where it amounted to 70-186 kg/km². In the anticyclonic circulation the abundance of flyingfish is extremely low, their biomass is no greater than 8 kg/km². In the central part of the eastern Atlantic flyingfish undertake horizontal migrations. The species composition of flyingfish is most diverse in the region between 4 and 14°N.--Concl.

81-002795 Nikolayeva, Ye. T. DYNAMICS OF ABUNDANCE OF LARGE POPULATIONS OF THE CHUM SALMON, *ONCORHYNCHUS KETA*, IN KAMCHATKA. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtirol.)* 20(3):66-76. 1980. SFA 26(4)

[KoTINRO, Petropavlovsk-Kamchatskiy, USSR]

81-002796 Philippart, J. C. ECOLOGIE D'UNE POPULATION DE VANDOISES, *LEUCISCUS LEUCISCUS* (L.) DANS LA RIVIERE OURTHE (BASSIN DE LA MEUSE, BELGIQUE). [POPULATION ECOLOGY OF THE DACE, *LEUCISCUS LEUCISCUS* (L.), IN THE RIVER OURTHE (RIVER MEUSE BASIN, BELGIUM).] *Ann. Limnol.* 17(1):41-62. 1981. In French with English summ. SFA 26(4)

[Inst. Zool., Univ. Liège, Belgium] From samples of dace taken by electrofishing from 1971 to 1976, the chief features of the population have been described and analysed: age structure (maximum age was 15 years), variations in the abundance of the different year-classes for 1958-1972, annual mortality rate ($M = 38\%$), growth rate in length (21 cm at 5 years for the two sexes combined), sex ratio (males/females = 1.04), age of sexual maturity (3-4 years and 16 cm), absolute individual fecundity as a function of size and age, seasonal cycle of the condition and development of the gonads, length-weight relationship, spawning period. The dynamics (growth in weight, survival, fecundity and somatic production) are summarised for a typical cohort. Estimates are made for the absolute population biomass (6.3 kg/ha), somatic production (2.3 kg/ha/year), potential reproduction (35 ovules/m²) and the exploitation of the fishery (2.0 kg/ha/year). The discussion reviews the demography of dace in several european rivers.

81-002797 Schooley, J. K. THE STRUCTURE AND FUNCTION OF SOUTH TEMPERATE ESTUARINE FISH COMMUNITIES. Ph.D. dissertation, Univ. Fla. 118p. 1980. From Diss. Abstr. Int. B Sci. Eng. 42(2):491. Aug. 1981. SFA 26(4)

81-002798 Spratt, J. D. STATUS OF THE PACIFIC HERRING, *CLUPEA HARENGUS PALLASII*, RESOURCE IN CALIFORNIA 1972 TO 1980. *Calif. Dep. Fish Game Fish Bull.* 171. 107p. 1981. Available from Off. Procurement, Publ. Sect., P.O. Box 1015, North Highlands, CA 95660. SFA 26(4)

The California Department of Fish and Game has conducted periodic studies on Pacific herring since 1953. This report concentrates on the period from 1972 through 1980 during which the herring fishery underwent a dramatic resurgence due to the opening of a lucrative market for herring roe in Japan. The spawning biomass of Pacific herring was estimated by determining numbers of eggs spawned and using previously derived estimates of eggs per gram of fish to convert this figure to short tons of herring. Spawning biomass estimates for Tomales Bay ranged from 4,728 tons in the 1974-75 season to 22,163 tons in the 1977-78 season. Estimates for San Francisco Bay ranged from 6,179 tons in 1973-74 season to 52,869 tons in the 1979-80 season. Sampling the roe fishery catch in Tomales and San Francisco Bays revealed that age 2 and 3 herring dominated the round haul fishery, and ages 5 and 6 dominated the gill net fishery. Gill nets consistently caught larger herring and higher percentage of females than round haul nets. Comparison of length

SPORT FISHERY ABSTRACTS

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

81-002798 CONTINUED at age of herring from Tomales and San Francisco Bays revealed a statistical difference in growth rates between populations of the two bays. Tomales Bay herring are larger at a given age than San Francisco Bay herring. Spawning time was related to the tidal cycle in San Francisco Bay. From 1973 through 1976, 88% of all spawnings occurred when the daily high tide was at night. The resurgence of the fishery and evolution of current management strategies of quotas, seasons, and resource monitoring are discussed.

81-002799 Timmons, T. J.; W. L. Shelton and W. D. Davies. EARLY GROWTH AND MORTALITY OF LARGEMOUTH BASS IN WEST POINT RESERVOIR, ALABAMA-GEORGIA. *Trans. Am. Fish. Soc.* 110(4):489-494. July 1981. SFA 26(4)
[Ala. Coop. Fish. Res. Unit, Auburn Univ., Auburn, AL 36849]

81-002800 Weinstein, M. P. and M. P. Walters. GROWTH, SURVIVAL AND PRODUCTION IN YOUNG-OF-YEAR POPULATIONS OF *LEIOSTOMUS XANTHURUS* LACÉPÈDE RESIDING IN TIDAL CREEKS. *Estuaries* 4(3):185-197. Sept. 1981. SFA 26(4)
[Dep. Biol., Va. Commonwealth Univ., Richmond 23284] Growth, mortality, and production rates for spot, *Leiostomus xanthurus* Lacépède, were studied from January 1977 through August 1978 in tidal creeks of the Cape Fear estuary, North Carolina. Winter growth rates were low, averaging 0.14 and 0.16 mm per day in 1977 and 1978, respectively. Mortality rates were significantly higher in polyhaline marshes during 1977, however, similar rates were observed in oligohaline marshes in 1978. The difference is believed due to higher freshwater flows experienced in 1978, which apparently increased mortality rates upriver. Pooled monthly production estimates for all sampling sites combined yielded a value of 0.17 g per m² (257 cal per m²). This figure is similar to those reported for spot collected in seagrass meadows in the vicinity of the Cape Fear estuary (Adams 1976). Because spot migrate offshore in the fall, this production also represents potential export of energy to the marine environment in the form of living biomass.

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC.

81-002801 Bishop, D. and B. Havrilak. HYDROLOGIC STUDIES ON THE TSIRKU-CHILKAT RIVER CONFLUENCE: A MAJOR SALMON SPAWNING HABITAT. *Proc. Alaska Sci. Conf. (Fairbanks)* 32:92-93. 1981. Abstract only. SFA 26(4)
[12175 Mendenhall Loop Rd., Juneau, AK 99801]

81-002802 Boer, B. A. de. INFLUENCE OF POPULATION DENSITY ON THE TERRITORIAL, COURTING AND SPAWNING BEHAVIOUR OF MALE *CHROMIS CYANEUS* (POMACENTRIDAE). *Behaviour* 77(1-2):99-120. 1981. SFA 26(4)
[Caribb. Mar. Biol. Inst., Curaçao, Netherlands Antilles]

81-002803 Burger, C. RADIO TRACKING OF ADULT SALMON IN THE KENAI RIVER, ALASKA. *Proc. Alaska Sci. Conf. (Fairbanks)* 32:91-92. 1981. Abstract only. SFA 26(4)
[Natl. Fish. Res. Cent., 1011 E. Tudor Rd., Anchorage, AK 99503]

81-002804 Dominey, W. J. THE MATING SYSTEM OF THE BLUEGILL SUNFISH (CENTRARCHIDAE: *LEPOMIS MACROCHIRUS*). Ph.D. dissertation, Cornell Univ. 142p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(4):1347. Oct. 1981. SFA 26(4)

SPORT FISHERY ABSTRACTS

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

- 81-002805 Dubin, R. E. PAIR SPAWNING IN THE PRINCESS PARROTFISH, *SCARUS TAENIOPTERUS*. *Copeia* 1981(2):475-477. May 1981. SFA 26(4)
[Zool. Dep., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]
- 81-002806 Goldberg, S. R. SEASONAL SPAWNING CYCLE OF THE CALIFORNIA TONGUEFISH, *SYMPHURUS ATRICAUDA* (CYNOGLOSSIDAE). *Copeia* 1981(2):472-473. May 1981. SFA 26(4)
[Dep. Biol., Whittier Coll., Whittier, CA 90608]
- 81-002807 Gross, M. R. and A. M. MacMillan. PREDATION AND THE EVOLUTION OF COLONIAL NESTING IN BLUEGILL SUNFISH (*LEPOMIS MACROCHIRUS*). *Behav. Ecol. Sociobiol.* 8(3):163-174. June 1981. SFA 26(4)
[Dep. Zool., NJ-15, Univ. Wash., Seattle 98195]
- 81-002808 Haglund, T. R. DIFFERENTIAL REPRODUCTION AMONG THE LATERAL PLATE PHENOTYPES OF *GASTEROSTEUS ACULEATUS*, THE THREESPINE STICKLEBACK. Ph.D. dissertation, UCLA 128p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(4):1293. Oct. 1981. SFA 26(4)
Reproductive success was examined in a population of threespine sticklebacks, *Gasterosteus aculeatus*, in Sespe Creek, Ventura County, California. Phenotypes were characterized by the number of lateral plates each individual possessed because lateral plate number and symmetry of plate number have been shown to be highly heritable. Differential reproductive success in females (fecundity) was not related to lateral plate phenotype. Among males of the population, however, differential reproductive success was related to lateral plate phenotype. Males with 11 through 14 lateral plates were significantly more successful than males with 7 through 10 lateral plates in obtaining territories and acquiring eggs. Differences in levels of aggression are suggested as the major causal factor in the observed differential reproduction. These differences in levels of aggression are genetically related to a male's lateral plate phenotype. Nesting depth is also shown to have a slight but significant effect on male reproductive success.
- 81-002809 Hughes, D. F. and W. A. Hubert. FECUNDITY OF LARGEMOUTH BASS FROM PICKWICK RESERVOIR, TENNESSEE RIVER. *J. Ala. Acad. Sci.* 52(2):53-57. Apr. 1981. SFA 26(4)
[Dep. Biol., Univ. North Ala., Florence, AL 35630] Fecundity of largemouth bass was estimated from observations of 37 fish (292-577 mm total length) collected prior to spawning from Pickwick Reservoir. Estimated fecundity ranged from 4,700 to 79,900 ova per female and was correlated to total length and weight. Fecundity of Pickwick Reservoir fish was compared to other localities.
- 81-002810 Hulata, G.; S. Rothbard and R. R. Avtalion. EVIDENCE FOR MULTIPLE PATERNITY IN *SAROTHERODON* BROODS. *Aquaculture* 25(2-3):281-283. Aug. 1981. SFA 26(4)
[Agric. Res. Organ., Fish Aquacult. Res. Stn., Dor, D.N., Hof Hacarmel 30820, Israel] Electrophoretic and morphological identification indicate the participation of two different males in the fertilization of a batch of *Sarotherodon* eggs.
- 81-002811 Itzkowitz, M. REPRODUCTIVE BEHAVIOR OF AN ENDEMIC JAMAICAN CYPRINODONT FISH, *CHRIOPEIODES PENGELLEYI*. *Copeia* 1981(2):473-474. May 1981. SFA 26(4)
[Dep. Biol., Lehigh Univ., Bethlehem, PA 18015]
- 81-002812 La Riviere, M. G.; D. D. Jessup and S. B. Mathews. LINGCOD, *OPHODON ELONGATUS*, SPAWNING AND NESTING IN SAN JUAN CHANNEL, WASHINGTON. *Calif. Fish Game* 67(4):231-239. Oct. 1981. SFA 26(4)

SPORT FISHERY ABSTRACTS

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

81-002812 CONTINUED

[Friday Harbor Lab., Friday Harbor, WA 98250] The spawning season and nest guarding behavior of lingcod, *Ophiodon elongatus*, in San Juan Channel of northern Puget Sound, Washington, began in mid-December and continued through May. Nests were located from 2.4 to 19.8 m below MLLW, usually in crevices or under boulders. Most were attended by a guardian male. Nests were located along transects only where there was a combination of suitable substrate and high currents. Predation by invertebrates was common; vertebrate predation uncommon. It was estimated that 40% of the 35 nests encountered successfully hatched.

81-002813 MacCrimmon, H. R. and D. J. Gordon. SALMONID SPAWNING RUNS AND ESTIMATED OVA PRODUCTION IN NORMANDALE CREEK OF LAKE ERIE. *J. Great Lakes Res.* 7(2):155-161. 1981. SFA 26(4)

[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada] The Normandale Creek study area (2,531 m²) provides spawning and nursery grounds for lake-run coho salmon (*Oncorhynchus kisutch*), rainbow trout (*Salmo gairdneri*), and brown trout (*Salmo trutta*). In 1973-74, 59 adult salmonids (58% rainbow trout, 39% coho salmon, and 3% brown trout) ascended the stream between 31 October and 12 May. Upstream movements were significantly related to peak stream discharge ($r=0.21$) and highly significantly related to discharge occurring on the day following the peak freshet ($r=0.34$). Despite a highly significant correlation ($r=0.29$) between flow and water temperature, the latter factor is not significantly related with upstream movement of adult fish. Coho salmon spawned at water temperatures of 1 to 10°C between 2 November and 19 December, rainbow trout at 1 to 15°C between 9 November and 14 May, and brown trout at 7°C between 4 and 5 November. Of 86 nests constructed, 66% were disturbed by re-use or sand deposition. From a calculated deposition of 90,403 ova, it is estimated that some 22% survived to emergence.

81-002814 Marliave, J. B. HIGH INTERTIDAL SPAWNING UNDER ROCKWEED, *FUCUS DISTICHUS*, BY THE SHARPNOSE SCULPIN, *CLINOCOTTUS ACUTICEPS*. *Can. J. Zool.* 59(6):1122-1125. June 1981. In English with French summ. SFA 26(4)

[Vancouver Publ. Aquarium, P.O. Box 3232, Vancouver, BC V6B 3X8, Canada]

81-002815 Morse, W. W. REPRODUCTION OF THE SUMMER FLOUNDER, *PARALICHTHYS DENTATUS* (L.). *J. Fish Biol.* 19(2):189-203. Aug. 1981. SFA 26(4)

[NMFS, Sandy Hook Lab, Highlands, NJ 07732] The reproduction of summer flounder, *Paralichthys dentatus* (L.), occurring in the Middle Atlantic Bight was studied from 1974-1979. Males dominated the length interval between 21-35 cm t.l. and were essentially absent in samples > 55 cm t.l. Females were more abundant in all length intervals > 45 t.l. Length at maturity ranged from 24-27 cm t.l. for males and from 30-33 cm t.l. for females which coincided with length at age two. Ovarian egg diameter frequencies indicated summer flounders are serial spawners and the trend in mean and maximum maturity indexes (% ovary weight of total fish weight) indicated spawning began in September and continued through February in 1975 and probably into March in 1976. Annual condition cycle of males peaked in September and was lowest in April while females' cycle reached a maximum in October which coincided with peak spawning time. Fecundity was related to length, weight and ovary weight for 1974-1977 and the length-fecundity equation $F=0.0007975 L^{3.402}$ was found to be the best predictive relationship. The overall reproductive strategy of summer flounder was discussed and apparently tends to maximize reproductive potential through an extended spawning season, early maturation, high fecundity, serial spawning and extensive spawning migrations.

81-002816 Mulford, C. J. LOCATION AND DESCRIPTION OF STRIPED BASS SPAWNING GROUNDS, BRAZOS RIVER, TEXAS. *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 2:73-87. 1979(1980). SFA 26(4)

[Tex. Parks Wildl. Dep., Fort Worth 76114]

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

81-002817 Peterson, R. H. and J. L. Metcalfe. EMERGENCE OF ATLANTIC SALMON FRY FROM GRAVELS OF VARYING COMPOSITION: A LABORATORY STUDY. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1020. iii + 15p. Aug. 1981. In English with French summ. SFA 26(4)

[Biol. Stn., St. Andrews, NB E0G 2X0, Canada] Atlantic salmon eggs were incubated in various gravel and sand mixtures with various water flows and two directions of water current. Fine sand (0.06-0.5 mm) was more effective than coarse sand (0.5-2.2 mm) in reducing numbers of emergent fry. The number of fry emerging was related to the formula $S_f/8 + S_c/16$ where S_f = proportion of fine sand and S_c proportion of coarse sand in the gravel mixture. Emergence was not affected by reduction of water supply to the eggs. Strong upwelling water currents mitigated the effects of sand to some degree. Upwelling water currents also induced earlier fry emergence. There was a tendency for smaller fry to emerge later.

81-002818 Pottle, R. A.; J. M. Green and G. Martel. DUALISTIC SPAWNING BEHAVIOUR OF THE CUNNER, *TAUTOGOLABRUS ADSPERSUS* (PISCES: LABRIDAE), IN BONNE BAY, NEWFOUNDLAND. *Can. J. Zool.* 59(8):1582-1585. Aug. 1981. In English with French summ. SFA 26(4)

[J. M. Green: Dep. Biol., Memorial Univ., St. John's, NF A1B 3X9, Canada]

81-002819 Roff, D. A. REPRODUCTIVE UNCERTAINTY AND THE EVOLUTION OF ITEROPARITY: WHY DON'T FLATFISH PUT ALL THEIR EGGS IN ONE BASKET? *Can. J. Fish. Aquatic Sci.* 38(8):968-977. Aug. 1981. In English with French summ. SFA 26(4)

[NMFS, P.O. Box 5667, St. John's, NF A1C 5X1, Canada]

81-002820 Thakre, V. Y. and S. S. Bapat. MATURATION AND SPAWNING OF *RASBORA DANICONIUS*. (HAM.-BUCH.). *J. Bombay Nat. Hist. Soc.* 78(1):38-45. Apr. 1981. SFA 26(4)

[Dep. Zool., Marathwada Univ., Aurangabad, India]

81-002821 Todd, P. R. MORPHOMETRIC CHANGES, GONAD HISTOLOGY, AND FECUNDITY ESTIMATES IN MIGRATING NEW ZEALAND FRESHWATER EELS (*ANGUILLA* SPP.). *N. Z. J. Mar. Freshwater Res.* 15(2):155-170. 1981. SFA 26(4)

[Fish. Res. Div., Private Bag, Christchurch, New Zealand] During transition from the nonmigrant feeding stage to the migrant stage in *Anguilla australis* and *A. dieffenbachii* the eyes increase in area by a factor of 2 in males and of 1.5-1.6 in females. *A. dieffenbachii* is more sexually advanced at the beginning of the spawning migration. In males the gonadosomatic ratio (GSR) was 0.5-2.7 and histological sections showed spermatocytes as the most common stage of spermatogenesis. For *A. australis* the GSR was 0.03-0.70, and histologically spermatogonia were predominant. In *A. dieffenbachii* females the mean GSR was 8.12, mean egg diameter was 0.33 mm, and histological sections showed that most eggs were at the stage of yolk deposition. In contrast, the mean GSR of *A. australis* females was 3.5, mean egg diameter was 0.22 mm, and few eggs were at the yolked stage. Egg counts showed that fecundity increased with total length. Fecundity estimates for 23 *A. dieffenbachii* (total length 711-1452 mm) varied from 1.05 million to 20.83 million and for 26 *A. australis* (total length 516-933 mm) from 0.46 million to 3.06 million.

81-002822 Tsai, C.; M. N. Islam; M. R. Karim and K. U. M. S. Rahman. SPAWNING OF MAJOR CARPS IN THE LOWER HALDA RIVER, BANGLADESH. *Estuaries* 4(2):127-138. June 1981. SFA 26(4)

[Chesapeake Biol. Lab., Cent. Environ. Estuarine Stud., Univ. Md., Solomons 20688] Spawning biology and spawn fishery of three valuable species of Indian major carps, *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala*, in the

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

81-002822 CONTINUED lower Halda River, Bangladesh, were studied in 1978. The major carps spawned only in the Sonairchar oxbow-bend from April to June on or near the dates of the full moon and the new moon. The tide was then at its highest level, and there was heavy flood water runoff from the hill region with sharp increases in water level, turbidity and current velocity, as well as decreases in water temperature, dissolved oxygen, and hydrogen ion concentration. These three heterogeneric species, as a result of parallelism or convergence in evolution, overlap in their environmental requirements for spawning. The nursery ground of the major carp fry spawned in the Halda River was found to be in the Bay of Bengal. The brood stock origin is suspected to be at the Shankha River, 40 miles south of the Karnafuli River. The spawn fishery in the Halda River was intensive but inefficient. Engineering works and water management schemes are threatening the spawning habitat.

81-002823 Wallace, R. K., Jr. and J. S. Ramsey. REPRODUCTIVE BEHAVIOR AND BIOLOGY OF THE BLUESTRIPE SHINER (*NOTROPIS CALLITAENIA*) IN UCHEE CREEK, ALABAMA. *Am. Midl. Nat.* 106(1):197-200. July 1981. SFA 26(4)

[Ala. Coop. Fish. Res. Unit, Auburn Univ., Auburn, AL 36849] Ovaries of *Notropis callitaenia*, an Apalachicola River basin endemic, were examined from June 1977 to June 1978. The gonosomatic index and mean diameter of the largest eggs were greatest from April to August (21-25 C). Analysis of the size frequency distribution of eggs from fish collected in April, June, July and August showed that a large proportion of each ovary contained immature eggs (< 0.9 mm in diam.), which is indirect evidence for multiple or fractional spawning. Estimates of the number of mature eggs in ovaries ranged from 88-230, but the total number of eggs deposited may be much greater if fractional spawning occurs. Stream observations of spawning during June revealed brightly colored males breeding in crevices with drab females. Males attracted females to the spawning site by displaying at the site or by chasing females to the site from adjoining areas. Eggs were apparently extruded into a crevice, where they were immediately fertilized by the male. The adhesive, water-hardened eggs were 1.2-1.7 mm in diam. The findings indicate that *N. callitaenia* spawns in crevices from April to August and is probably a fractional spawner. The spawning behavior and fractional-crevice spawning mode are similar to other members of the subgenus *Cyprinella*.

81-002824 Yoon, T. [REPRODUCTIVE CYCLE OF FEMALE WALLEYE POLLOCK, *THERAGRA CHALCOGRAMMA* (PALLAS), IN THE ADJACENT WATERS OF FUNKA BAY, HOKKAIDO.] *Bull. Fac. Fish. Hokkaido Univ.* 32(1):22-38. Mar. 1981. In Japanese with English summ. SFA 26(4)

[Res. Inst. North Pac. Fish., Fac. Fish., Hokkaido Univ., Hokodate, Japan]

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC.

81-002825 Bakshtanskiy, E. L.; V. D. Nesterov and M. N. Neklyudov. THE BEHAVIOR OF YOUNG ATLANTIC SALMON, *SALMO SALAR*, DURING DOWNSTREAM MIGRATION. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):93-100. 1980. SFA 26(4)

[VNIRO, Moscow, USSR] The behavior of downstream migrants of Atlantic salmon, *Salmo salar*, was studied under natural conditions. Observations showed that single fishes near the bottom begin to migrate downstream; they form a group in front of a site of potential danger and only after a period of mutual learning do they form a school migrating near the surface. During the time of the downstream migration the young explore and actively overcome obstacles, seeking to avoid not only predators but also typical predators habitats and feeding areas. In order to increase the rate of survival of artificially reared salmon it is not enough to rear them to a greater size, it is also necessary to instill normal defensive behavior.

SPORT FISHERY ABSTRACTS

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC. (CONTINUED)

81-002826 Hayashi, K. and S. Odate. [ON DISTRIBUTION PATTERN OF LARVAE OF PACIFIC SAURY.] *Bull. Jpn. Soc. Sci. Fish.* 47(6):705-711. June 1981. In Japanese with English summ. SFA 26(4)
[Tohoku Reg. Fish. Res. Lab., Shiogama, Miyagi 985, Japan]

81-002827 Haynes, J. M. and R. H. Gray. DIEL AND SEASONAL MOVEMENTS OF WHITE STURGEON, *ACIPENSER TRANSMONTANUS*, IN THE MID-COLUMBIA RIVER. *NOAA Fish. Bull.* 79(2):367-370. Apr. 1981. SFA 24(6)
[Dep. Biol. Sci., State University Coll., Brockport, NY 14420]

81-002828 Hubert, W. SPRING MOVEMENTS OF SMALLMOUTH BASS IN THE WILSON DAM TAILWATER, ALABAMA. *J. Tenn. Acad. Sci.* 56(3):105-106. July 1981. SFA 26(4)
[TVA, Muscle Shoals, AL 35660] Movements of seven adult smallmouth bass (*Micropterus dolomieu*) in the Wilson Dam tailwater were monitored using ultrasonic transmitters. Fish showed pronounced homing abilities and home range tendencies. Rock cover and current velocities influenced movement patterns of tagged specimens.

81-002829 Love, M. S. EVIDENCE OF MOVEMENTS OF SOME DEEPWATER ROCKFISHES (SCORPAENIDAE: GENUS *SEBASTES*) OFF SOUTHERN CALIFORNIA. *Calif. Fish Game* 67(4):246-249. Oct. 1981. SFA 26(4)
[Dep. Biol., Occidental Coll., 1600 Campus Rd., Los Angeles, CA 90041]

81-002830 McEachron, L. W. and G. C. Matlock. MOVEMENT OF SPOTTED SEATROUT (*CYNOSCIION NEBULOSIS*) TAGGED IN BASTROP BAYOU, TEXAS. *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 3:64-82. 1980(1981). SFA 26(4)
[Tex. Parks Wildl. Dep., P.O. Box 1707, Rockport 78382] During February 1976-April 1978, 736 spotted seatrout (*Cynoscion nebulosus*) were caught for tagging with hook and line at Bastrop Bayou marina in the Galveston Bay system. Of 68 tag returns, 57 were used to determine distance traveled, days free and general movement patterns for spotted seatrout. The average number of days free was 230 with most (82.1%) of the 57 fish being returned within 1 yr. Recaptured spotted seatrout traveled an average of 24 km with the majority (75.0%) being returned from within the Galveston Bay system. A movement of spotted seatrout from Bastrop Bayou to the shallow Gulf was noted during summer with 57 fish (19.3%) being returned from the inshore Gulf waters. A movement of fish out of Bastrop Bayou during late fall was also detected. It was hypothesized that fish were leaving the bayou and returning at a later date but analysis of the data using a sine curve failed to substantiate this hypothesis. It is recommended that intensive tagging studies of spotted seatrout should be conducted to determine if fish in other Texas bays are behaving the same way as those in Bastrop Bayou.

81-002831 Melville-Smith, R.; D. Baird and T. Wooldridge. THE UTILIZATION OF TIDAL CURRENTS BY THE LARVAE OF AN ESTUARINE FISH. *S. Afr. J. Zool.* 16(1):10-13. 1981. In English with Afrikaans summ. SFA 26(4)
[Sea Fish. Inst., Private Bag, Sea Point, Cape Town 8001, South Africa] The mechanisms employed by *Gilchristella aestuarius* larvae to maintain their position in an estuary were investigated in the Sundays River estuary, South Africa. The larvae predominated in the bottom water on both the flood and ebb tides and by so doing, utilized the flood-tide bottom-water current and avoided the ebb-tide surface current, the net result being a transport of the larvae upstream. There was no evidence to suggest that the larvae migrate laterally toward favourable, or away from unfavourable, currents.

81-002832 Morin, R.; J. J. Dodson and G. Power. THE MIGRATIONS OF ANADROMOUS CISCO (*COREGONUS ARTEDII*) AND LAKE WHITEFISH (*C. CLUPEAFORMIS*) IN ESTUARIES OF EASTERN JAMES BAY. *Can. J. Zool.*

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC. (CONTINUED)

81-002832 CONTINUED 59(8):1600-1607. Aug. 1981. In English with French summ. SFA 26(4)

[J. J. Dodson: GIROQ, Dep. Biol., Univ. Laval, Quebec, PQ G1K 7P4, Canada]

81-002833 Pakhorukov, A. M.; A. M. Kuznetsov and G. N. Kuragina. POSSIBILITIES OF EXPERIMENTAL INVESTIGATION OF THE DOWNSTREAM MIGRATION OF YOUNG FISHES. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(3):123-130. 1980. SFA 26(4)

[IEMEZh, Moscow, USSR] In order to work out methods of investigating the downstream migration of young fishes, hydrodynamic apparatuses of 2 types have been constructed. In a circular apparatus with differing hydrodynamic conditions we studied the behavior of juvenile fish during a change in illumination, and the influence of some chemical agents. In a ring-shaped apparatus with rectilinear stretches and a smooth longitudinal velocity gradient we studied the behavior of juvenile fishes, modeling the daily rhythm of illumination and the influence on the behavior of young fishes of such factors as flow velocity, rate of change in illumination, density of fish in the group and circadian rhythm. We determined the parameters of the factors investigated, at which it is possible to reproduce in a ring-shaped hydrodynamic apparatus with rectilinear stretches the "downstream migration" of juvenile fishes similar to that of young fishes in the river.

81-002834 Snelson, F. F., Jr. and S. E. Williams. NOTES ON THE OCCURRENCE, DISTRIBUTION, AND BIOLOGY OF ELASMOBRANCH FISHES IN THE INDIAN RIVER LAGOON SYSTEM, FLORIDA. *Estuaries* 4(2):110-120. June 1981. SFA 26(4)

[Dep. Biol. Sci., Univ. Cent. Fla., Orlando 32816] Fifteen species of elasmobranchs, eight sharks and seven rays, have been recorded with reasonable certainty from the Indian River lagoon system on the central east coast of Florida. We collected four shark and six ray species during a three and one-half year study of the northern portion of the lagoon system. Five of these appear to be year-round residents, and the remainder utilize the area only at restricted times of the year or as a nursery ground. The most abundant resident species are *Dasyatis sayi*, *D. sabina*, and *Carcharhinus leucas*. *Pristis pectinata*, once a common resident species, has been extirpated from the lagoons. The distribution of ocean inlets and salinity appear to be major factors affecting diversity and numbers of elasmobranchs in the Indian River system.

FOODS/FEEDING

81-002835 Applegate, R. L. FOOD SELECTION OF MUSKELLUNGE FRY. *Prog. Fish-Cult.* 43(3):136-139. July 1981. SFA 26(4)

[S. Dak. Coop. Fish. Res. Unit, S. Dak. State Univ., Brookings 57007]

81-002836 Clark, A. L. and E. R. Mancini. FOOD HABITS OF LARVAL SMALLMOUTH BASS (*MICROPTERUS DOLOMIEUI* LACEPEDE) IN THE MIDDLE FORK VERMILLION RIVER, VERMILLION COUNTY, ILLINOIS. *Trans. Ill. State Acad. Sci.* 73(1):65-71. 1980. SFA 26(4)

[Woodward-Clyde Consultants, 3489 Kurtz St., San Diego, CA 92110] The food habits of 182 smallmouth bass larvae (*Micropterus dolomieu* Lacepede) collected from the Middle Fork Vermillion River on 14 June 1978 were investigated. The gut of each 8-23.5 mm SL larva was filled to capacity with one or more of the following groups of food items; Copepoda, Cladocera, Chironomidae, Ephemeroptera, and other larval fishes. Statistical analyses of the percentage frequency of occurrence of those food items demonstrated a significantly greater ($P < 0.001$) use of zooplankters as a food source by larvae 8 to 14 mm SL, while bass larvae 14 to 20 mm SL fed significantly ($P < 0.001$) more often in aquatic insects. Smallmouth bass larvae 20 to 23.5 SL fed exclusively on aquatic insects and other larval fishes. The data

FOODS/FEEDING (CONTINUED)

81-002836 CONTINUED suggest that as the bass larvae increase in length there is a concomitant increase in the size of their preferred food items resulting in a discrete partitioning of exploitable food resources. The importance of these data to year-class and recruitment is discussed.

81-002837 Coetzee, D. J. ANALYSIS OF THE GUT CONTENTS OF THE NEEDLEFISH, *HYPORHAMPHUS KNYSNAENSIS* (SMITH), FROM RONDEVLEI, SOUTHERN CAPE. *S. Afr. J. Zool.* 16(1):14-20. 1981. In English with Afrikaans summ. SFA 26(4)

[Cape Dep. Nat. Environ. Conserv., Jonkershoek Nat. Conserv. Stn., P.B. 5014, Stellenbosch, 7600 South Africa] The gut contents of 313 specimens of *Hyporhamphus knysnaensis* from Rondevlei were analysed. The total lengths of the collected fish varied between 5.1 and 21.8 cm. It was found that the annual cycle in the occurrence of submerged macrophytes in Rondevlei appears to directly influence the feeding of *H. knysnaensis* of 9 to 17 cm long. This length-group fed mainly on animal material (mostly amphipods and isopods) in winter and the first half of spring while submerged macrophytes were scarce. After the submerged macrophytes became more abundant, however, the 9 to 17-cm length-group changed to a predominantly plant diet (consisting of *Ruppia spiralis* and *Potamogeton pectinatus*). *H. knysnaensis* between approximately 5 and 9 cm long appeared in summer and fed mainly on animal material (mostly amphipods and isopods). Of the 47 specimens collected in the length-group between December 1978 and March 1979, all had animal material in their gut contents. It was the dominant food in 94% of the specimens and formed 90% of the gut contents. In general, therefore, *H. knysnaensis* can be considered an omnivore.

81-002838 Collins, M. R. THE FEEDING PERIODICITY OF STRIPED MULLET, *MUGIL CEPHALUS* L., IN TWO FLORIDA HABITATS. *J. Fish Biol.* 19(3):307-315. Sept. 1981. SFA 26(4)

[Dep. Zool., Univ. Fla., Gainesville 32611] The feeding periodicity of *Mugil cephalus* (striped mullet) was investigated during the summer and autumn of 1979 using percentage body weight made up of stomach contents as an indicator of feeding intensity. One study site was freshwater, the other was estuarine and both were tidally influenced. Mullet at both sites feed diurnally, with maximum intensity occurring at about 11.00 hours and little or no feeding occurring at night. Fish from the freshwater site have larger standard length-specific intestine lengths and also include more plant material in their diet than do mullet from the estuarine site. At both sites fish longer than 28 cm standard length (S.L.) tend to be female; the difference from a 50:50 sex ratio is highly significant in both cases. Females longer than 28 cm S.L. outnumber all other sex and size combinations at the freshwater site, but comprise only 28% of fish collected at the estuarine site.

81-002839 Elrod, J. H.; W.-D. N. Busch; B. L. Griswold; C. P. Schneider and D. R. Wolfert. FOOD OF WHITE PERCH, ROCK BASS AND YELLOW PERCH IN EASTERN LAKE ONTARIO. *N.Y. Fish Game J.* 28(2):191-201. July 1981. SFA 26(4)

[U.S. Fish Wildl. Serv., Great Lakes Fish. Lab., Ann Arbor, MI 48105] The contents of stomachs from 1,485 white perch, 218 rock bass and 1,399 yellow perch collected in eastern Lake Ontario from May to October in 1972 and in May 1973 were examined. All three species fed primarily on amphipods, but they also ate chironomids and trichopterans regularly. Rock bass ate more trichopterans than chironomids, whereas white perch and yellow perch ate more chironomids. Snails and crayfish were significant items in the diet of rock bass, but occurred infrequently in stomachs of white perch and yellow perch. White perch and yellow perch frequently ate fish eggs during the early summer, but rock bass seldom ate fish eggs. Fish were important in the diets of white perch longer than 300 millimeters and rock bass and yellow perch longer than 200 millimeters. Similarities in the diets of fish 1 year old or older suggest that the potential for competition between white perch and yellow perch is greater than that between rock bass and either white perch or yellow perch.

FOODS/FEEDING (CONTINUED)

81-002840 Ferrari, I. and A. R. Chiericato. FEEDING HABITS OF JUVENILE STAGES OF *SPARUS AURATUS* L., *DICENTRARCHUS LABRAX* L. AND MUGILIDAE IN BRACKISH EMBAYMENT OF THE PO RIVER DELTA. *Aquaculture* 25(2-3):243-257. Aug. 1981. SFA 26(4)

[Inst. Zool., University, Via Borsari 46, 44100 Ferrara, Italy] The feeding habits of juvenile stages of gilthead (*Sparus auratus* L.), sea bass (*Dicentrarchus labrax* L.) and three species of grey mullets (*Liza ramada* Risso, *Liza aurata* Risso and *Liza saliens* Risso) in a Po Delta embayment (Sacca di Scardovari) were studied. Samples were taken over two years, 1977 (from April to June) and 1978 (from February to December). The stomach contents of a total of 858 individuals were examined. The feeding habits of fish fry of the five species did not differ noticeably in the smaller-sized stages (standard length (SL) < 30mm), which are carnivorous with a prevalently planktophagous diet; Cirripedia nauplii, Copepoda and Polychaeta larvae are the most important food items. The food preferences tend to change when the size is over a SL of 30 mm; gilthead feed preferentially on macrobenthos (Polychaeta and Amphipoda) and macrophyte detritus, and sea bass on macroplankton (Mysidacea, Decapoda larvae and fish larvae); grey mullets have a mixed diet including benthic microalgae, sand and silt, zoobenthos and zooplankton organisms. The diet of young grey mullets is furthermore characterized by the presence of adult insects. The composition of the stomach contents of the different fry species was also analyzed in relation to the composition of some zooplankton and zoobenthos taxocoenoses in the embayment.

81-002841 Foster, J. R. FACTORS INFLUENCING THE PREDATOR-PREY RELATIONS OF A SMALL ESOCID, THE GRASS PICKEREL (*ESOX AMERICANUS VERMICULATUS*). Ph.D. dissertation, Univ. Toronto 1980. From Diss. Abstr. Int. B Sci. Eng. 42(1):51. July 1981. SFA 26(4)

81-002842 Gardner, M. B. MECHANISMS OF SIZE SELECTIVITY BY PLANKTIVOROUS FISH: A TEST OF HYPOTHESES. *Ecology* 62(3):571-578. June 1981. SFA 26(4)

[Dep. Zool., Univ. Wash., Seattle 98195] The role of decision in size-selective predation by planktivorous fish is not clear. What causes size selectivity when many prey can be seen simultaneously (high prey density) is also not well understood. Suspended clay particles were used in experiments to control the number of *Daphnia pulex* that could be seen simultaneously by bluegill sunfish (*Lepomis macrochirus*) in order to test between alternative hypotheses. In clear pools, ≈ 122 *Daphnia* of two distinct size classes could be seen simultaneously by the fish. In turbid pools, the probability that two or more *Daphnia* could be seen simultaneously was < .01, although initial density was the same as in the clear pools. Size selectivity exhibited by the bluegills was independent of turbidity level and the number of prey seen simultaneously. A differential encounter rate hypothesis and the apparent-size selection hypothesis, both based on a perceptual bias for the larger size class, are rejected. The outcome of the experiments indicates that size selectivity resulted from decisions by the fish to ignore the smaller size class of *Daphnia*. The role of decision in prey selection and foraging strategies is discussed.

81-002843 Godin, J.-G. J. EFFECT OF HUNGER ON THE DAILY PATTERN OF FEEDING RATES IN JUVENILE PINK SALMON, *ONCORHYNCHUS GORBUSCHA* WALBAUM. *J. Fish Biol.* 19(1):63-71. July 1981. SFA 26(4)

[Dep. Biol., Mount Allison Univ. Sackville, NB E0A 3C0, Canada] Juvenile pink salmon, *Oncorhynchus gorbuscha*, in two test groups of differing hunger level fed continuously on live copepods, maintained at high densities, throughout 12 h feeding periods in the laboratory. Analysis of video films showed that mean feeding rates were initially (first 10 min) between 51.5 and 63.8 prey-captured attempts (snaps) fish⁻¹ 10 min⁻¹, but declined abruptly with increasing satiation to relatively constant levels of about 5.0 and 8.0 snaps fish⁻¹ 10 min⁻¹, which were maintained during the subsequent 11 h of feeding. The data suggests that

FOODS/FEEDING (CONTINUED)

81-002843 CONTINUED after the initial filling of their stomachs with food, juvenile pink salmon keep their stomachs full by feeding at a rate that balances the gastric evacuation rate of $18.6 \text{ mg prey h}^{-1}$ at 11°C . Less than 15% of the fish's stomach contents need be evacuated apparently for spontaneous feeding to resume or occur. Increased hunger level (by increasing a pre-test food deprivation period from 24 to 72 h) resulted in fish increasing their average feeding rate and thus their ration consumed from 23.6 to 39.8% dry body weight per 12 h.

81-002844 Gorelova, T. A. THE FEEDING OF YOUNG FLYINGFISHES OF THE FAMILY EXOCOEIDAE AND OF THE SMALLWING FLYINGFISH, *OXYPORHAMPUS MICROPTERUS*, OF THE FAMILY HEMIRHAMPIDAE. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):60-71. 1980. SFA 26(4)

[IOAN, Moscow, USSR] The results of an investigation of the contents of the intestines of the larvae and juveniles of 8 species of flyingfishes of the family Exocoetidae and of the smallwing flyingfish, *Oxyporhampus micropterus* (Hemirhamphidae), 4-30 mm in size from the tropical Pacific are presented. The similarity in the feeding spectra of all the species of fish studied is very great. Copepoda constitute the bulk of their food, members of the suborder Cyclopoida predominating. The size of the food items did not exceed 2.5 mm. The larvae and fingerlings feed near the surface only during the hours of daylight. The specific daily rations calculated on the basis of the indices of stomach fullness of the larvae under natural conditions amount to 1.5-27.5; at different stations and, as a rule, are in direct relation to the biomass of the food items.

81-002845 Hodson, R. G.; J. O. Hackman and C. R. Bennett. FOOD HABITS OF YOUNG SPOTS IN NURSERY AREAS OF THE CAPE FEAR RIVER ESTUARY, NORTH CAROLINA. *Trans. Am. Fish. Soc.* 110(4):495-501. July 1981. SFA 26(4)

[Zool. Dep., N.C. State Univ., Raleigh 27650]

81-002846 Hurlbert, S. H. and M. S. Mulla. IMPACTS OF MOSQUITOFISH (*GAMBUSIA AFFINIS*) PREDATION ON PLANKTON COMMUNITIES. *Hydrobiologia* 83(1):125-151. 14 Aug. 1981. SFA 26(4)

[Dep. Biol., San Diego State Univ., San Diego, CA 92182]

81-002847 Johnson, J. H. COMPARATIVE FOOD SELECTION BY COEXISTING SUBYEARLING COHO SALMON, CHINOOK SALMON AND RAINBOW TROUT IN A TRIBUTARY OF LAKE ONTARIO. *N.Y. Fish Game J.* 28(2):150-161. July 1981. SFA 26(4)

[N.Y. State Dep. Environ. Conserv., Albany 12223] The stomach contents of 370 subyearling coho salmon, chinook salmon and rainbow trout occupying the same section of a New York tributary of Lake Ontario were examined during the period from May through October in 1978. Aquatic invertebrates, mainly ephemeropterans and chironomids, predominated in the foods taken during the first month after emergence, while subsequently their mean monthly contribution to the diet was 21, 37 and 54 per cent for the three species, respectively. From July to October, the average monthly overlap in diet between coho salmon and chinook salmon (0.5781) was essentially identical to that between chinook salmon and rainbow trout (0.5780), while that between coho salmon and rainbow trout was 0.4933. In this stream during the study, the salmon occupied pools and the trout riffles. Comparison of the feeding data for 1978 with data for the coho salmon and rainbow trout in the stream in 1977 suggested that coho salmon may have shifted their diet toward allochthonous prey when chinook salmon were present.

81-002848 Johnson, J. H. and E. Z. Johnson. FEEDING PERIODICITY AND DIET VARIATION IN DIET COMPOSITION OF SUBYEARLING COHO SALMON, *ONCORHYNCHUS KISUTCH*, AND STEELHEAD, *SALMO GAIARDNERI*, IN A SMALL STREAM DURING SUMMER. *NOAA Fish. Bull.* 79(2):370-376. Apr. 1981. SFA 26(4)

[Nez Perce Tribe of Idaho, PO Box 365, Lapwai 83540]

FOODS/FEEDING (CONTINUED)

81-002849 Johnson, J. H. THE SUMMER DIET OF THE CUTLIPS MINNOW, *EXOGLOSSUM MAXILLINGUA*, IN A CENTRAL NEW YORK STREAM. *Copeia* 1981(2):484-487. May 1981. SFA 26(4)

[N. Y. State Dep. Environ. Conserv., 50 Wolf Rd., Albany 12233]

81-002850 Kneib, R. T. THE RESPONSES OF A SOFT-SEDIMENT INTERTIDAL COMMUNITY TO EXPERIMENTAL MANIPULATIONS OF THE POPULATION SIZE STRUCTURE AND DENSITY OF A PREDATOR, *FUNDULUS HETEROCLITUS* (L.). Ph.D. dissertation, Univ. N.C. 244p. 1980. From Diss. Abstr. Int. B Sci. Eng. 42(2):489. Aug. 1981. SFA 26(4)

On the basis of these experiments, it is concluded that *Fundulus* population size structure significantly affects prey density and population structure. These induced changes in prey availability are reflected in the intensity of competition within *Fundulus* size classes. Depending on fish size, intraspecific competition may affect growth, mortality or fecundity, leading to further changes in predator population structure with predictable consequences for the prey community.--From abstr.

81-002851 Langton, R. W. and R. E. Bowman. FOOD OF EIGHT NORTHWEST ATLANTIC PLEURONECTIFORM FISHES. NOAA Tech. Rep. NMFS SSRF 749. iii + 61p. Sept. 1981. SFA 26(4)

[Dep. Mar. Resour., West Boothbay Harbor, ME 04575] The food of eight species of pleuronectid fishes, occurring in the northwest Atlantic, from Cape Hatteras, N.C., to Nova Scotia have been investigated for the years 1969-72. Gulf Stream flounder, *Citharichthys arctifrons*, are annelid and arthropod predators. Summer and fourspot flounders, *Paralichthys dentatus* and *P. oblongus*, prey on fish, squid, and arthropods. The diet of the windowpane, *Scophthalmus aquosus*, consists of arthropods with mysids, pandalid shrimp, and sand shrimp being especially important prey. Witch flounder, *Glyptocephalus cynoglossus*, are predators of benthic invertebrates, preying heavily on annelids. The primary prey of American plaice, *Hippoglossoides platessoides*, is echinoderms. Yellowtail flounder, *Limanda ferruginea*, are annelid and amphipod predators. Winter flounder, *Pseudopleuronectes americanus*, prey on annelids, coelenterates, and bivalve molluscs.

81-002852 Lipskaya, N. Ya. THE FEEDING AND FOOD REQUIREMENTS OF THE YOUNG OF THE SMALLWING FLYINGFISH, *OXYPORHAMPUS MICROPTERUS MICROPTERUS* (HEMIRHAMPIDAE). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):72-79. 1980. SFA 26(4)

[VNIRO, Moscow, USSR]

81-002853 Mattson, S. THE FOOD OF *GALEUS MELASTOMUS*, *GADICULUS ARGENTEUS THORI*, *TRISOPTERUS ESMARKII*, *RHINONEMUS CIMBRIUS*, AND *GLYPTOCEPHALUS CYNOGLOSSUS* (PISCES) CAUGHT DURING THE DAY WITH SHRIMP TRAWL IN A WEST-NORWEGIAN FJORD. *Sarsia* 66(2):109-127. 1981. SFA 26(4)

[Kristeineberg Mar. Biol. Stn., S450 34 Fiskebäckskil, Sweden]

81-002854 Mel'nikov, Yu. S. FEEDING PECULIARITIES OF *ALLOCYTTUS VERRUCOSUS*, FAMILY OREOSOMATIDAE. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(3):99-105. 1980. SFA 26(4)

[AzCherNIRO, Kerch, USSR]

81-002855 Payne, S. L. FEEDING PREFERENCES OF POSTLARVAL LONGNOSE GAR (*LEPISOSTEUS OSSEUS*) OF THE OHIO RIVER. M.S. thesis, Univ. Louisville 75p. 1980. From Masters Abstr. 19(2):127. June 1981. SFA 26(4)

The foods and food preferences of postlarval longnose gar from the Ohio River (Miles 579-582) were determined from field collections and laboratory experiments. Two diurnal series of gar (n=662; total length = 18.5-47.6 mm)

FOODS/FEEDING (CONTINUED)

81-002855 CONTINUED taken in June, 1979, contained primarily cladocerans (especially *Scapholeberis kingi*), copepods, chironomids, culicids, and larval fishes. The most abundant plankters in the river at the time were copepods and Bosminidae (Cladocera). Backcalculation of time of capture of the larval fish indicated that feeding activity peaked during late afternoon (1400-1800 hours), although some feeding occurred at all hours. Two cases of cannibalism were noted. Gar between 20.0 and 33.5 mm TL showed a preference for larval fish (6.9-11.0 mm TL) when presented simultaneously with larval fish and zooplankton in the laboratory. Larval fish (5.0-9.0 mm TL) were digested sufficiently to pass from the stomach to the intestines of the gar in 10 to 14 hours at 21°C.

81-002856 Rand, D. M. and G. V. Lauder. PREY CAPTURE IN THE CHAIN PICKEREL, *ESOX NIGER*: CORRELATIONS BETWEEN FEEDING AND LOCOMOTOR BEHAVIOR. *Can. J. Zool.* 59(6):1072-1078. June 1981. In English with French summ. SFA 26(4)

[G. V. Lauder: Dep. Anat., Univ. Chicago, 1025 East 57th Street, Chicago, IL 60667] The predatory behavior of the chain pickerel *Esox niger* was studied by high-speed cinematography to correlate patterns of jaw bone movement with locomotor patterns. Pattern B strikes were initiated at significantly shorter distances from the prey, had higher acceleration rates, and the velocity of mouth opening and suspensorial abduction was greater than for pattern A strikes. No difference was found in the excursion amplitudes of jaw movements between pattern A and pattern B strikes. Significant differences were found between midwater and corner strikes in the amplitude of mouth opening and hyoid depression: both were smaller in corner attacks and suction velocity was higher. Both velocity and amplitude of each mechanical unit in the head can be varied depending on the locomotor pattern and the position of the prey.

81-002857 Rosen, R. A. and D. C. Hales. FEEDING OF PADDLEFISH, *POLYODON SPATHULA*. *Copeia* 1981(2):441-455. May 1981. SFA 26(4)

[Mass. Coop. Fish. Res. Unit, Univ. Mass., Amherst 01003] The food of adult paddlefish, *Polyodon spathula*, from a section of the Missouri River (South Dakota-Nebraska) in 1975-76 was almost entirely crustacean zooplankton. Paddlefish were indiscriminate filter feeders and apparently ingested all material strained from the water column; organisms less than about 0.20-0.25 mm long (0.10-0.12 mm wide) were not retained. Detritus and sand averaged over 50% of the stomach contents by volume. Feeding peaked in spring and fall and ceased from late June to early September. Food intake did not change perceptibly over a 24-h period. Gill rakers begin to appear along gill arches when fish reach 65 mm eye-to-fork length (EFL) and are thought to become fully functional when fish reach 225-250 mm (EFL). The interrake distance was not significantly different between gill rakers on the same gill arch; gill raker width varied. The relationship between fish length (EFL) and interrake distance (I) near the base of the gill rakers was $I = 3.4 \times 10^{-5} \text{EFL} + 0.035$. The mean mesh size for fish 139-855 mm (EFL) ranged from about 0.06-0.09 mm. Our results are consistent with a hypothesis that assumes paddlefish have a non-sticky filter for which particle retention may be moderately altered.

81-002858 Stein, R. A.; R. F. Carline and R. S. Hayward. LARGEMOUTH BASS PREDATION ON STOCKED TIGER MUSKELLUNGE. *Trans. Am. Fish. Soc.* 110(5):604-612. Sept. 1981. SFA 26(4)

[Dep. Zool., Ohio State Univ., 1735 Neil Ave., Columbus 43210]

81-002859 Tarverdiyeva, M. I. and I. A. Pinskaya. THE FEEDING OF FISHES OF THE FAMILIES NOTOTHENIIDAE AND CHAENICHTHYIDAE ON THE SHELVES OF THE ANTARCTIC PENINSULA AND THE SOUTH SHETLANDS. *J. Ichthyol. (Engl. Transl.)*

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FOODS/FEEDING (CONTINUED)

81-002859 CONTINUED Vopr. Ikhtiol.) 20(4):50-60. 1980. SFA 26(4)
[VNIRO, Moscow, USSR]

81-002860 Thorp, J. H. and E. A. Bergey. FIELD EXPERIMENTS ON RESPONSES OF A FRESHWATER, BENTHIC MACROINVERTEBRATE COMMUNITY TO VERTEBRATE PREDATORS. *Ecology* 62(2):365-375. Apr. 1981. SFA 26(4)
[Savannah River Ecol. Lab., P.O. Drawer E, Aiken, SC 29801]

81-002861 Williams, A. H. AN ANALYSIS OF COMPETITIVE INTERACTIONS IN A PATCHY BACK-REEF ENVIRONMENT. *Ecology* 62(4):1107-1120. Aug. 1981. SFA 26(4)
[Dep. Zool. Entomol., Auburn Univ., Auburn, AL 36830] Manipulative field experiments were used to test for the existence of competitive interactions between three abundant herbivore species in a shallow back-reef zone. Densities of the territorial threespot damselfish, *Eupomacentrus planifrons*, and two sea urchins, *Diadema antillarum* and *Echinometra viridis*, were altered through addition and removal experiments conducted within patches of staghorn coral, *Acropora cervicornis*. Removals of each urchin species resulted in population increases of the other urchin. Additions of each urchin species tended to inhibit increases of the other species. Removals of damselfish resulted in increases in *Diadema* density within 24h, while *Echinometra* density increased during the 3rd d following the perturbation. Dry biomass of algae on ceramic tiles in the lower strata of damselfish removal patches were reduced by 62% as compared with algal biomass in these strata in the presence of damselfish. Wire mesh cages were utilized over a 2-mo period to test the effect of predation on competition at the herbivore level. No significant alteration of species numbers was observed in the absence of predation. Therefore, predation did not appear to affect significantly the distributions and abundances of the adult members of the community. Low predation levels on adults within this system do not appear to alter the competitive interactions between these herbivores. Interference competition by the threespot damselfish appears to mediate competition between the two echinoids, allowing coexistence of all species. The presence of damselfish may reduce destructive echinoid grazing pressure on the coral substrate.

81-002862 Williams, D. D. THE FIRST DIETS OF POSTEMERGENT BROOK TROUT (*SALVELINUS FONTINALIS*) AND ATLANTIC SALMON (*SALMO SALAR*) ALEVINS IN A QUEBEC RIVER. *Can. J. Fish. Aquatic Sci.* 38(7):765-771. July 1981. In English with French summ. SFA 26(4)
[Div. Life Sci., Scarborough Coll., Univ. Toronto, West Hill, ON M1C 1A4, Canada]

81-002863 Wyanski, D. M. and T. E. Targett. FEEDING BIOLOGY OF FISHES IN THE ENDEMIC ANTARCTIC HARPAGIFERIDAE. *Copeia* 1981(3):686-693. 26 Aug. 1981. SFA 26(4)
[Skidaway Inst. Oceanogr., P.O. Box 13687, Savannah, GA 31406] The feeding biology of nine species of Antarctic fishes in the Harpagiferidae was investigated. Gut contents from 174 specimens, collected at various locations in the Antarctic Region, were analyzed. The species examined all have a similar feeding mode, preying on actively moving organisms which occur either in the water column close to the bottom or actually on the bottom sediments. The fishes generally fed on the same prey groups (e.g., gammaridean amphipods, errant polychaetes, isopods and mysids) but in varying proportions. Changes in diet with increasing fish length were evident for the three species of *Pogonophryne*. The specimens of all three species <100 mm SL consumed primarily gammaridean amphipods, whereas specimen >100 mm SL fed almost exclusively on larger prey items (e.g., mysids, large isopods, large gammaridean amphipods, shrimp and fish). The morphology, food habits and feeding behavior of harpagiferids are strikingly similar to those of sculpins (Cottidae) in north temperate waters. The similarities

SPORT FISHERY ABSTRACTS

FOODS/FEEDING (CONTINUED)

81-002863 CONTINUED between the Harpagiferidae and the Cottidae are an interesting example of convergent evolution.

AGE AND GROWTH

81-002864 Ashley, K. W.; D. L. Garling, Jr. and J. J. Ney. USE OF THE AGE-LENGTH RELATIONSHIP AS A MARKER FOR DIFFERENTIATING GEOGRAPHICAL STOCKS OF ADULT CHANNEL CATFISH. *N. Am. J. Fish. Manage.* 1(1):77-79. 1981. SFA 26(4)
[Sch. For. Resour. Conserv., Univ. Fla., Gainesville 32611]

81-002865 Avedikova, T. M. SOME GROWTH PATTERNS OF STURGEONS (FAMILY ACIPENSERIDAE) OF THE SEA OF AZOV. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(3):84-90. 1980. SFA 26(4)
[AzNIIRKh, Rostov-on-Don, USSR]

81-002866 Beamish, R. J. and D. A. Fournier. A METHOD FOR COMPARING THE PRECISION OF A SET OF AGE DETERMINATIONS. *Can. J. Fish. Aquatic Sci.* 38(8):982-983. Aug. 1981. In English with French summ. SFA 26(4)
[Dep. Fish. Oceans, Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

81-002867 Bengtson, D. A. and R. C. Barkman. GROWTH OF POSTLARVAL ATLANTIC SILVERSIDES IN FOUR TEMPERATURE REGIMES. *Prog. Fish-Cult.* 43(3):146-148. July 1981. SFA 26(4)
[U.S. EPA, Naragansett, RI 02822]

81-002868 Bivings, A. E. IV and R. L. Noble. VARIATION IN FIRST YEAR GROWTH OF LARGEMOUTH BASS IN A NORTH TEXAS FARM POND. *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 3:83-91. 1980(1981). SFA 26(4)
[Dep. Wildl. Fish Sci., Tex A&M Univ., College Station 77843] Young-of-the-year bass were sampled in a north Texas farm pond over five successive years. Samples taken in the fall showed strongly bimodal length-frequency distributions accentuated by an abundance of bass less than 150 mm. Most spring samples showed a single mode of bass greater than 200 mm and few if any bass less than 150 mm. It was postulated that abundance of forage was the major cause of the bimodal fall samples and that predation was the major factor in the low over-winter survival of bass less than 150 mm producing a single mode in the spring samples.

81-002869 Ezenwa, B. I. O. and K. Ikusemiju. AGE AND GROWTH DETERMINATIONS IN THE CATFISH, *CHRYSICHTHYS NIGRODIGITATUS* (LACÉPÈDE) BY USE OF THE DORSAL SPINE. *J. Fish Biol.* 19(3):345-351. Sept. 1981. SFA 26(4)
[Dep. Biol. Sci., Univ. Lagos, Lagos, Nigeria] Annual rings on the first dorsal spine were used to determine the age and growth of the catfish, *Chrysichthys nigrodigitatus* (Lacépède), in the Lagos Lagoon, Nigeria. From back-calculations, it was found that the mean total length of the species when the first annulus was formed was 18.5 cm, 32.6 cm for second annulus, 43.5 cm for the third annulus and 53.9 cm for the fourth annulus. It was shown that this species in the Lagos lagoon attained four years of age and that the fastest growth in length was achieved during the first year of life. Thereafter, increase in length gradually decreased with age. The relationship between the body length and dorsal spine radius was shown to be linear and highly correlated.

AGE AND GROWTH (CONTINUED)

81-002870 Gasser, K. W.; D. A. Cannamela and D. W. Johnson. CONTRIBUTIONS TO THE LIFE HISTORY OF THE SHORTHEAD SCULPIN, *COTTUS CONFUSUS*, IN THE BIG LOST RIVER, IDAHO: AGE, GROWTH, AND FECUNDITY. *Northwest Sci.* 55(3):174-181. Aug. 1981. SFA 26(4)

[Hancock Biol. Stn., Murray State Univ., Murray, KY 42071] Age, growth, and fecundity were examined for 513 shorthead sculpin, *Cottus confusus*, collected from the Big Lost River, Idaho. Age determination by otoliths revealed six age classes, with growth being fastest the first year (33 mm) and slowing to approximately 10 to 12 mm a year thereafter. Age class composition and condition varied with the habitat. Condition also fluctuated seasonally. Fecundity ranged from 184 to 511 eggs and was proportional to length.

81-002871 Harris, R. K. SOME THOUGHTS ON CONDITION FACTOR INDICIES WITH RESPECT TO LARVAL WALLEYE POLLOCK *Theragra chalcogramma* (PALLAS) IN THE SOUTHEASTERN BERING SEA. *Proc. Alaska Sci. Conf. (Fairbanks)* 32:90. 1981. Abstract only. SFA 26(4)

[Inst. Mar. Sci., Univ. Alaska, Fairbanks 99701]

81-002872 Ivanova, M. N. ON THE LIFE SPAN OF THE SMELT, *OSMERUS EPERLANUS*, OF LAKE BELOYE. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(3):91-98. 1980. SFA 26(4)

[Inst. Biol. Inland Waters, USSR Acad. Sci., Borok, Yaroslavl' Reg., USSR] The life span of the Lake Beloye smelt, *Osmerus eperlanus*, was studied. The life span depends on time of sexual maturation and rate of growth in the first year of life. The greatest life span (up to 4 years) is characteristic of smelt which grow slowly in the first year of life, mature for the first time in the second year and have a low individual absolute and relative fecundity.

81-002873 Kogan, A. V.; N. P. Nekrasova and I. K. Popova. FEEDING PECULIARITIES OF THE YOUNG OF THE ROACH, *Rutilus rutilus* AND PERCH, *Perca fluviatilis*, DURING DOWNSTREAM MIGRATION. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(3):106-113. 1980. SFA 26(4)

[IEMEZh, Moscow, USSR] The feeding spectrum and indices of consumption of the downstream migrating young of the roach, *Rutilus rutilus*, and the perch, *Perca fluviatilis*, are determined by the food composition and daily feeding rhythm peculiar to them near the river banks. In fish with a typically "daytime" rhythm (roach), there is no sharp difference between the fullness and food composition of fish feeding near the banks and fish migrating downstream. For fish with a twilight-nocturnal feeding rhythm (perch) this difference is the greater the more definitely food consumption is confined to night-time. The daily rations of young roach and perch for June-July near the banks of the Upper Volga and its tributaries are calculated.

81-002874 Kunin, M. A. BIOLOGICAL INDICES OF THE EASTERN BREEM, *ABRAMIS BRAMA ORIENTALIS*, IN RELATION TO THE DIFFERENT FEEDING CAPACITY OF ITS ENVIRONMENT. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):42-50. 1980. SFA 26(4)

[VNIRO, Moscow, USSR]

81-002875 Laurs, R. M. and J. A. Wetherall. GROWTH RATES OF NORTH PACIFIC ALBACORE, *THUNNUS ALALUNGA*, BASED ON TAG RETURNS. *NOAA Fish. Bull.* 79(2):293-302. Apr. 1981. SFA 26(4)

[NMFS, P.O. Box 271, La Jolla, CA 92038]

81-002876 Lincoln, R. F. THE GROWTH OF FEMALE DIPLOID AND TRIPLOID PLAICE (*PLEURONECTES PLATESSA*) X FLOUNDER (*PLATICHTHYS FLESUS*) HYBRIDS OVER ONE SPAWNING SEASON. *Aquaculture* 25(2-3):259-268. Aug. 1981. SFA 26(4)

[Fish. Lab., Lowestoft, Suffolk NR33 0HT, England]

AGE AND GROWTH (CONTINUED)

81-002877 Modde, T. and C. C. Stone. GROWTH AND BIOMASS OF LARGEMOUTH BASS (*MICROPTERUS SALMOIDES*) IN A WESTERN SOUTH DAKOTA STOCK POND. *Proc. S.D. Acad. Sci.* 59:138-146. 15 July 1980. SFA 26(4)

[Dep. Wildl. Fish. Sci., S. Dak. State Univ., Brookings 57007] Self sustaining populations of largemouth bass, *Micropterus salmoides*, and pumpkinseed, *Lepomis gibbosus*, from a 1.74 ha pond in Jones County, South Dakota, were analyzed after complete removal with rotenone. The growth rate of bass in the study pond was similar to rates reported from regional lakes and reservoirs where bass do not reach sexual maturity until their third growing season. The condition of bass was characterized by high relative weights (Wr) within the smallest and largest fish. According to indices of weight (total availability, $A_t = 35.1\%$) and numbers (proportional stock density, PSD, = 40.0%), the largemouth bass exhibited a balance population structure. However, the biomass of both bass, 35.9 kg/ha, and pumpkinseed, 39.5 kg/ha, was comparatively low, with the greatest density of the latter composed of intermediate sized individuals. The low density of small pumpkinseed appeared to adversely affect the condition of smaller piscivorous bass. The low biomass of the bass population appeared to be primarily a function of the total weight and population structure of the pumpkinseed forage base rather than low production potential.

81-002878 Moring, J. R.; K. J. Anderson and R. L. Youker. HIGH INCIDENCE OF SCALE REGENERATION BY POTAMODROMOUS COASTAL CUTTHROAT TROUT: ANALYTICAL IMPLICATIONS. *Trans. Am. Fish. Soc.* 110(5):621-626. Sept. 1981. SFA 26(4)

[Me. Coop. Fish. Res. Unit, Dep. Zool., Univ. Me., Orono 04469]

81-002879 Pate, M. W. AGE AND GROWTH OF FLATHEAD CATFISH, *PYLODICTIS OLIVARIS*, IN THE RIO GRANDE RIVER, TEXAS. *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 3:92-102. 1980(1981). SFA 26(4)

[Tex. Agric. Ext. Serv., Tex. A&M Univ., College Station 77843] Forty flathead catfish, *Pylodictis olivaris*, were captured from the Rio Grande River, Webb County, Texas. Vertebrae were extracted from each fish and evaluated for patterns indicative of age and growth. Multiple observations of vertebrae indicated insignificant winter mark variance within fish. Formulation of a body length to vertebrae radius relationship revealed proportional growth. Average back-calculated lengths from vertebrae indicated growth rates after the second year of life resulting in higher growth than reported elsewhere. No significant difference in condition was found between males and females.

81-002880 Pollock, B. R. AGE DETERMINATION AND GROWTH OF LUDERICK, *GIRELLA TRICUSPIDATA* (QUOY AND GAIMARD), TAKEN FROM MORETON BAY, AUSTRALIA. *J. Fish Biol.* 19(4):475-485. Oct. 1981. SFA 26(4)

[Queensland Fish. Serv., Queensland, Australia]

81-002881 Radtke, R. L. and J. M. Dean. MORPHOLOGICAL FEATURES OF THE OTOLITHS OF THE SAILFISH, *ISTIOPHORUS PLATYPTERUS*, USEFUL IN AGE DETERMINATION. *NOAA Fish. Bull.* 79(2):360-367. Apr. 1981. SFA 26(4)

[Pac. Gamefish Found., P.O. Box 25115, Honolulu, HI 96825]

81-002882 Robotham, P. W. J. AGE, GROWTH AND REPRODUCTION OF A POPULATION OF SPINED LOACH, *COBITIS TAENIA* (L.). *Hydrobiologia* 85(2):129-136. 20 Nov. 1981. SFA 26(4)

[Div. Biol., Derby Lonsdale Coll., England] 751 specimens of spined loach, *Cobitis taenia* (L.), were collected and studied over the period October 1972-October 1974. The majority of the males were found to die at the end of the 2+ season and the majority of the females at the end of the 3+ season. Back calculations for length at age were carried out from otolith measurements and found to correspond closely to actual measurements. Males

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81-002882 CONTINUED and females grew similarly up until the end of their 1+ year of life, with most rapid growth occurring in the first year. Females continued to grow rapidly up to 2+, the rate then being reduced; the males showed an increasingly reduced rate of growth after the 1+ year. Ford Walford plots gave L_{∞} results which corresponded closely in most cases with the largest observed specimens. Gonad development and maturation of males and females followed different patterns. Males matured during the 1+ year at a length of approximately 40mm from which point their dry gonad weight remained at a steady 0.02-0.03% of the body weight. Females appeared to mature a year later and their ovary weight and oocyte diameter increased with fish age. A seasonal cycle in gonad development was evident in females. There was a greater proportion of females to males, especially in the older age group. Spawning time was estimated to be between June and July.

81-002883 Schnute, J. A VERSATILE GROWTH MODEL WITH STATISTICALLY STABLE PARAMETERS. *Can. J. Fish. Aquatic Sci.* 38(9):1128-1140. Sept. 1981. In English with French summ. SFA 26(4)

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[U.S. Soil Conserv. Serv., Water Resour. Staff, 675 U.S. Courthouse, Nashville, TN 37203] This paper describes the age and growth of white crappie from Butterfly Hole, an impoundment created by flood waters of the Mississippi River, in Mississippi County, Arkansas. The observed length (66-356 mm) - weight (5.5-718 g) relationship was $\text{Log } W = 0.134 + 0.924 \text{ Log } L$. The regression coefficient of 0.924 was significantly different from 3.0, indicating that the weight of the crappie did not increase as the cube of length within the hole. The rate of weight gain rapidly decreased for all year classes, following impoundment. The coefficient of condition (K) for individual fish ranged from 1.45 to 1.95, with an average of 1.64. This was higher than the condition coefficient noted in other nearby water bodies. The total length (L) - Scale radius (S) relationship for Butterfly Hole crappie was $L = 50.98 + 48.53S$ with a correlation coefficient (r) of 0.96. Comparison of lengths of age groups I, II, and III (years) revealed no difference ($\alpha = 0.01$) between the year classes 1975-1977, indicating that post impoundment growth was the same for all these year classes. Superior growth was noted within the hole during the year of impoundment, presumably due to food-nutrient concentration within the hole and lack of competition.

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[Great Lakes Res. Div., Univ. Mich., Ann Arbor 48109] During 1976-1979, the authors organized a cooperative Great Lakes Regional Fish Larvae Collection (GLRFLC): collection, compilation, and organization continue to the present. GLRFLC objectives, informal support from the University of Michigan Museum of Zoology, and clearly established collection policies, curating, and data processing procedures provide long-term continuity and availability of GLRFLC material. Included in GLRFLC are some larval stages of 61 species of Great Lakes drainage basin fishes. An additional 56 species are housed in other collections cross-listed in GLRFLC. Four lists of GLRFLC data are available from the authors: (1) a summary of larval fish species from the drainage basin listed in the GLRFLC information system (2) GLRFLC holdings, (3) other collections cross-listed in GLRFLC, and (4) individuals interested in GLRFLC or aspects of larval fish biology. All data are stored in computer format to permit rapid information storage, editing, and retrieval. Specimen storage, maintenance, and shipping procedures promote availability and efficiency of specimen exchanges and loans.

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[Dep. Fish. Wildl. Sci., VPI&SU, Blacksburg, VA 24061] Brown trout have been stocked in Virginia streams since 1962. While the establishment of brown trout fisheries tends to enhance fishing quality, no extensive studies have been made to identify reasons for the success or failure of these introductions. The objective of this study was to determine characteristics of Virginia streams most likely to support self-sustaining brown trout populations. The physico-chemical conditions of six streams containing brown trout were studied in order to evaluate the relationship between these factors and brown trout populations. Study streams varied in fish population abundance, vegetation type, temperature, flow, gradient, width, depth, and habitat quality. Forty-one environmental attributes were measured at study sites on each stream. Those parameters significantly correlated ($P \leq .05$) with brown trout biomass were used to develop multiple regression models. Of the environmental variables measured, brown trout biomass on two sampling dates (June and November) was closely correlated with alkalinity, hardness, conductivity, total phosphates, percent canopy, percent gravel sediment type, and percent rubble sediment type.

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[Freshwater Biol. Assoc., Ferry House, Ambleside, Cumbria LA22, OLP, England] The downstream movement of young trout and salmon in relation to water velocity was studied in simulated river channels. The results are interpreted as showing that these young salmonids pass through a short period when they are very vulnerable to downstream displacement by flow. Behavioural differences between the two species are considered with the influence on fish movement of changing rate of water velocity, light and temperature.

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[Dep. Biol., Lafayette Coll., Easton, PA 18042] The lophiid anglerfish genus *Lophiodes* is revised based on examination of all known specimens. Of the 20 nominal species, 11 are recognized as valid and two additional species are described as new. The genus is defined using osteological as well as other morphological characters and a key to the species is provided. Characters that demonstrate intraspecific stability and interspecific variability are described and used to define and differentiate the species, and to propose an hypothesis of their phylogenetic relationships. Geographic and bathymetric distributions are described for each species and the former are plotted. Shared derived character states are used to demonstrate the existence of four distinct species groups.

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81-003004 Kennedy, C. R. LONG TERM STUDIES ON THE POPULATION BIOLOGY OF TWO SPECIES OF EYEFLUKE, *DIPLOSTOMUM GASTEROSTEI* AND *TYLODELPHYS CLAVATA* (DIGenea: DIPLOSTOMATIDAE), CONCURRENTLY INFECTING THE EYES OF PERCH, *PERCA FLUVIATILIS*. *J. Fish Biol.* 19(2):221-236. Aug. 1981. SFA 26(4)

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81-003007 Kohn, A. and B. M. M. Fernandes. THE ADULT FORM OF *HIMASTHLA PSICICOLA* STUNKARD, 1960 AND OTHER TREMATODES FROM BRAZILIAN FRESHWATER FISHES. *J. Helminthol.* 55(2):85-87. June 1981. SFA 26(4)

[Dep. Helminthol., Inst. Oswaldo Cruz, Fiocruz, C.P. 926, Rio de Janeiro, FJ, Brazil]

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- 81-003008 Kovalenko, L. M. [THORNY-HEADED WORMS OF SOME FISHES IN THE TROPICAL ZONE OF THE PACIFIC OCEAN.] *Zool. Zh.* 60(8):1140-1144. Aug. 1981. In Russian with English summ. SFA 26(4)
[Pac. Inst. Fish. Oceanogr., Vladivostok, USSR]
- 81-003009 Kruse, G. O. W. TREMATODES OF MARINE FISHES FROM SOUTH AUSTRALIA. 3. *LEPOCREADIUM ANGELAE* SP. N. (LEPOCREADIIDAE). *Proc. Helminthol. Soc. Wash.* 48(2):195-197. July 1981. SFA 26(4)
[Univ. Nebr. State Mus., Univ. Nebr., Lincoln 68588]
- 81-003010 Leatherland, J. F. and R. A. Sonstegard. THYROID DYSFUNCTION IN GREAT LAKES COHO SALMON, *ONCORHYNCHUS KISUTCH* (WALBAUM): SEASONAL AND INTERLAKE DIFFERENCES IN SERUM T3 UPTAKE AND SERUM TOTAL AND FREE T4 AND T3 LEVELS. *J. Fish Dis.* 4(5):413-423. Sept. 1981. SFA 26(4)
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- 81-003011 Lee, R. L. G. ECOLOGY OF *ACANTHOCEPHALUS LUCII* (Müller, 1776) IN PERCH, *PERCA FLUVIATILIS*, IN THE SERPENTINE, LONDON, UK. *J. Helminthol.* 55(2):149-154. June 1981. SFA 26(4)
[Dep. Zool., Imperial Coll., London SW7, England]
- 81-003012 Markhaseva, E. L. [NEW SPECIES OF THE GENUS *BATHEUCHAETA* (CALANOIDA, AETIDEIDAE) FROM THE KURILE-KAMCHATKA TRENCH AND REDESCRIPTION OF *B. LAMELLATA*.] *Zool. Zh.* 60(8):1151-1159. Aug. 1981. In Russian with English summ. SFA 26(4)
[Zool. Inst., USSR Acad. Sci., Leningrad, USSR]
- 81-003013 Mashego, S. N. and J. E. Saayman. OBSERVATIONS ON THE PREVALENCE OF NEMATODE PARASITES OF THE CATFISH, *CLARIAS GARIEPINUS* (BURCHELL 1822), IN LEBOWA, SOUTH AFRICA. *S. Afr. J. Wildl. Res.* 11(2):46-48. 1981. In English with Afrikaans summ. SFA 26(4)
[Dep. Zool. Biol., Univ. North, P.B. X5090, Pietersburg 0700, South Africa]
- 81-003014 Paperna, I.; I. Sabnai and A. Zachary. ULTRASTRUCTURAL STUDIES IN PISCINE EPITHELIOCYSTIS: EVIDENCE FOR A PLEOMORPHIC DEVELOPMENTAL CYCLE. *J. Fish Dis.* 4(6):459-472. Nov. 1981. SFA 26(4)
[H. Steinitz Mar. Biol. Lab., P.O. Box 469, Eilat, Israel]
- 81-003015 Richards, K. S. and C. Arme. THE EFFECTS OF THE PLEROCERCROID LARVA OF THE PSEUDOPHYLLIDEAN CESTODE *LIGULA INTESTINALIS* ON THE MUSCULATURE OF BREAM (*ABRAMIS BRAMA*). *Z. Parasitenkd.* 65(2):207-215. July 1981. SFA 26(4)
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- 81-003016 Riis, R. C.; M. E. Georgi; L. Leibovitz and J. S. Smith. OCULAR METACERCARIAL INFECTION OF THE OYSTER TOADFISH, *OPSANUS TAU* (L.). *J. Fish Dis.* 4(5):433-435. Sept. 1981. SFA 26(4)
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- 81-003017 Schroeder, D. J.; A. D. Johnson and K. H. Mohammad. IN VITRO EXCYSTMENT OF THE BLACK SPOT TREMATODE *NEASCUS PYRIFORMIS* CHANDLER, 1951 (TREMATODA: DIPLOSTOMATIDAE). *Proc. Helminthol. Soc. Wash.* 48(2):184-189. July 1981. SFA 26(4)
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- 81-003018 Seagrave, C. P.; D. Bucke; E. B. Hudson and D. McGregor. A SURVEY OF THE PREVALENCE AND DISTRIBUTION OF PROLIFERATIVE KIDNEY DISEASE (PKD) IN ENGLAND AND WALES. *J. Fish Dis.* 4(5):437-439. Sept. 1981. SFA 26(4)
[D. Bucke: M.A.F.F., Fish Dis. Lab., Weymouth, Dorset DT4 4UB, England]
- 81-003019 Smith, R. E. and R. J. Kernehan. PREDATION BY THE FREE-LIVING COPEPOD, *CYCLOPS BICUSPIDATUS THOMASI*, ON LARVAE OF THE STRIPED BASS AND WHITE PERCH. *Estuaries* 4(1):81-83. Mar. 1981. SFA 26(4)
[Appalachian Environ. Lab., Frostburg State Coll. Campus, Frostburg, MD 21532]
- 81-003020 Tran The Do. PARASITIC COPEPODA *DIERGASILUS KASAHARAI* GEN. ET SP. NOV. FROM THE STRIPED MULLET *MUGIL CEPHALUS*. *Bull. Jpn. Soc. Sci. Fish.* 47(6):735-740. June 1981. SFA 26(4)
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- 81-003021 Veléz, I. ALGUNOS TREMATODOS (DIGINEA) DE PECES MARINOS DEL NORTE DE COLOMBIA. [SOME TREMATODES (DIGENEA) OF MARINE FISH FROM NORTH COLOMBIA.] *An. Inst. Invest. Mar. Punta Betin* 10:223-243. 1978. In Spanish with English summ. SFA 26(4)
[Inst. Invest. Mar. Punta de Betín, Apt. Aéreo 1016, Santa Marta, Colombia]
- 81-003022 Williams, D. D. and D. R. Sutherland. *KHAWIA SINENSIS* (CARYOPHYLLIDEA: LYTOCESTIDAE) FROM *CYPRINUS CARPIO* IN NORTH AMERICA. *Proc. Helminthol. Soc. Wash.* 48(2):253-255. July 1981. SFA 26(4)
[Dep. Plant Pathol. Seed Weed Sci., Iowa State Univ., Ames 50011]

POLLUTION

- 81-003023 Addison, R. F.; M. E. Zinck and D. E. Willis. TIME- AND DOSE-DEPENDENCE OF HEPATIC MIXED FUNCTION OXIDASE ACTIVITY IN BROOK TROUT *SALVELINUS FONTINALIS* ON POLYCHLORINATED BIPHENYL RESIDUES: IMPLICATIONS FOR 'BIOLOGICAL EFFECTS MONITORING'. *Environ. Pollut. Ser. A Ecol. Biol.* 25(3):211-218. July 1981. SFA 26(4)
[Mar. Ecol. Lab., Bedford Inst. Oceanogr., Dartmouth, NS, B2Y 4A2, Canada]
Brook trout *Salvelinus fontinalis* which had been fed a single dose of polychlorinated biphenyls (PCB: Aroclor 1254) had elevated hepatic mixed function oxidase (MFO) activity detectable between 2 and 20 days after feeding, as shown by ethoxycoumarin O-de-ethylase activity. O-de-ethylase activity was well correlated ($r=0.74$) with whole body PCB residues; both variables declined slowly during the period after feeding. In two dose-response experiments, hepatic O-de-ethylase activity increased with increasing PCB residue concentration deposited from a single feeding; the relationship was best described by a power function of the form: $\ln y = 0.23 \ln x + 5.8$ where y is O-de-ethylase activity as nanomoles of product formed per gramme of liver per hour; and x is PCB concentration in fillet as $\mu\text{g g}^{-1}$ wet weight. Despite the relatively insensitive response of O-de-ethylase activity to changes in PCB concentrations, the enzyme assay offers a potential screening method for the detection of 'hot-spots' of contamination by PCB, and possible other MFO inducers.
- 81-003024 Akielaszek, J. J. and T. A. Haines. MERCURY IN THE MUSCLE TISSUE OF FISH FROM THREE NORTHERN MAINE LAKES. *Bull. Environ. Contam. Toxicol.* 27(2):201-208. Aug. 1981. SFA 26(4)

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POLLUTION (CONTINUED)

81-003024 CONTINUED

[U.S. FWS, Columbia Natl. Fish Res. Lab., Field Res. Stn., Dep. Zool., Univ. Me., Orono 04469]

81-003025 Barrett, H. B. HISTORY OF HUMAN-USE IMPACTS ON LONG POINT BAY. *J. Great Lakes Res.* 7(2):81-88. 1981. SFA 26(4)
[11 Bridge St., Hamilton, ON L8S 4M1, Canada]

81-003026 Barwick, D. H. FECUNDITY OF THE BLACK CRAPPIE IN A RESERVOIR RECEIVING HEATED EFFLUENT. *Prog. Fish-Cult.* 43(3):153-154. July 1981. SFA 26(4)

[U.S. Fish Wildl. Serv., 206 Highway 123 By-Pass, Clemson, SC 29631]

81-003027 Batterman, A. R. and P. M. Cook. DETERMINATION OF MINERAL FIBER CONCENTRATIONS IN FISH TISSUES. *Can. J. Fish. Aquatic Sci.* 38(8):952-959. In English with French summ. SFA 26(4)

[U.S. EPA, 6201 Congdon Blvd., Duluth, MN 55804]

81-003028 Brown, D. J. A. and K. Sadler. THE CHEMISTRY AND FISHERY STATUS OF ACID LAKES IN NORWAY AND THEIR RELATIONSHIP TO EUROPEAN SULPHUR EMISSIONS. *J. Appl. Ecol.* 18(2):433-441. Aug. 1981. SFA 26(4)

[Cent. Elec. Res. Lab., Biol. Sect., Ratcliffe-on-Soar, Nottingham NG11 0EE, England] In the light of claims that some Scandinavian lakes have been adversely affected by European sulphur emissions, the data of Wright & Snækvik (1978) have been analysed in an attempt to estimate the effect of a reduction in these emissions on the fishery status of the lakes. The relationship of hydrogen-ion concentration and excess (non-sea) sulphate concentration is highly significant, but the slope of regression is only 0.225. On the assumptions that the excess sulphate is largely derived from combustion of fossil fuels, and that a regression derived from a regional survey can be used to predict trends in time, the average increase in pH of lakes that might result from a 50% reduction in European sulphur emissions would be 0.2 units. This figure is not inconsistent with estimates made from other studies, including analysis of historical data, sediment analysis and experimental catchment acidification. The relationship between pH and fishery status of the lakes, in terms of their ability to support good, sparse, or no fish populations, suggests that a pH change of 0.2 units would improve the fishery status category of 9% of the lakes. Fishery status of these lakes appears to be independent of excess sulphate concentrations.

81-003029 Bull, K. R.; A. F. Dearsley and M. H. Inskip. GROWTH AND MERCURY CONTENT OF ROACH (*Rutilus rutilus*, L.), PERCH (*Perca fluviatilis*, L.) AND PIKE (*Esox lucius*, L.) LIVING IN SEWAGE EFFLUENT. *Environ. Pollut. Ser. A Ecol. Biol.* 25(3):229-240. July 1981. SFA 26(4)

[NERC, Inst. Terres. Ecol., Monks Wood Exp. Stn., Abbots Ripton, Huntingdon, Cambs PE17 2LS, England] The growth rates and mercury content of roach (*Rutilus rutilus*, L.), perch (*Perca fluviatilis*, L.) and pike (*Esox lucius*, L.) living in treated sewage effluent at Rye Meads, Hertfordshire, Great Britain, are described and compared with those of a population of roach from the River Lee, Hertfordshire. Fish from the Rye Meads lagoons show typically high growth rates whilst their mercury content, which is positively correlated with size and age, indicates a slightly elevated mercury environment. Mercury concentrations in the sediment of the treatment lagoons which the roach and perch inhabit are slightly elevated. Roach from the River Lee show no increase of mercury concentration with age or size. Methylmercury represents a high proportion of the mercury found in all species.

POLLUTION (CONTINUED)

81-003030 Campbell, S. G. EFFECTS OF SILT ON BENTHIC INVERTEBRATES OF THE NORTH PLATTE RIVER. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:56. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. Abstract only. SFA 26(4)

[1500 W. 92nd #16, Denver, CO 80221]

81-003031 Canterbury, R. A. and B. H. Smith. ENERGY DEVELOPMENT IN THE OVERTHRUST BELT OF SOUTHWESTERN WYOMING: PRESENT PROBLEMS AND FUTURE POTENTIALS FOR AQUATIC RESOURCES ON PUBLIC LANDS. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:36-40. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. SFA 26(4)

[B. H. Smith: 2403 Victor Rd., Rock Springs, WY 82401]

81-003032 Chung, K. S. and K. Strawn. SEASONAL PREDICTED SURVIVAL OF ESTUARINE FISHES EXPOSED TO DISCHARGE EFFLUENT OF A POWER PLANT. *Bol. Inst. Oceanogr. Univ. Oriente Cumana* 16(1-2):127-140. 1977. In English with Spanish summ. SFA 26(4)

[Inst. Oceanogr., Univ. Oriente, Cumaná, Venezuela]

81-003033 Gallaway, B. J. AN ECOSYSTEM ANALYSIS OF OIL AND GAS DEVELOPMENT ON THE TEXAS-LOUISIANA CONTINENTAL SHELF. *U.S. Fish Wildl. Serv. Serv. FWS/OBS-81/27*. Aug. 1981. Available from U.S. Fish Wildl. Serv./NCET, 1010 Gause Blvd., Slidell, LA 70458]

81-003034 Giattina, J. D.; D. S. Cherry; J. Cairns, Jr. and S. R. Larrick. COMPARISON OF LABORATORY AND FIELD AVOIDANCE BEHAVIOR OF FISH IN HEATED CHLORINATED WATER. *Trans. Am. Fish. Soc.* 110(4):526-535. July 1981. SFA 26(4)

[EPA, West. Fish Toxicol. Stn., Corvallis, OR 97330]

81-003035 Haines, T. A. EFFECT OF AN AERIAL APPLICATION OF CARBARYL ON BROOK TROUT (*SALVELINUS FONTINALIS*). *Bull. Environ. Contam. Toxicol.* 27(4):534-542. Oct. 1981. SFA 26(4)

[U.S. FWS, Fish Res. Stn., Dep. Zool., Univ. Maine, Orono 04469]

81-003036 International Council for the Exploration of the Sea. REPORT OF THE ICES ADVISORY COMMITTEE ON MARINE POLLUTION, 1980. *Int. Counc. Explor. Sea Coop. Res. Rep.* 103. 24p. Mar. 1981. SFA 26(4)

[Palægade 2-4, DK-1261 Copenhagen K, Denmark]

81-003037 International Council for the Exploration of the Sea. REPORT OF THE ICES FOURTH ROUND INTERCALIBRATION FOR TRACE METALS IN SEA WATER. *Int. Counc. Explor. Sea Coop. Res. Rep.* 105. 92p. Apr. 1981. SFA 26(4)

[Palægade 2-4, DK-1261 Copenhagen K, Denmark]

81-003038 Jones, J. R.; B. H. Tracy; J. L. Sebaugh; D. H. Hazelwood and M. M. Smart. BIOTIC INDEX TESTED FOR ABILITY TO ASSESS WATER QUALITY OF MISSOURI OZARK STREAMS. *Trans. Am. Fish. Soc.* 110(5):627-637. Sept. 1981. SFA 26(4)

[Sch. For. Fish. Wildl., Univ. Mo., Columbia 65211]

81-003039 Kveseth, N. J. RESIDUES OF DDT IN A CONTAMINATED NORWEGIAN LAKE ECOSYSTEM. *Bull. Environ. Contam. Toxicol.* 27(3):397-405. Sept. 1981. SFA 26(4)

[Natl. Inst. Forensic Toxicol., Sognsvannsveien 28, Oslo 3, Norway]

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81-003040 Mac, M. J. and J. G. Seelye. PATTERNS OF PCB ACCUMULATION BY FRY OF LAKE TROUT. *Bull. Environ. Contam. Toxicol.* 27(3):368-375. Sept. 1981. SFA 26(4)

[U.S. FWS, Great Lakes Fish. Lab., Ann Arbor, MI 48105]

81-003041 Maynard, D. J. and D. D. Weber. AVOIDANCE REACTIONS OF JUVENILE COHO SALMON (*ONCORHYNCHUS KISUTCH*) TO MONOCYCLIC AROMATICS. *Can. J. Fish. Aquatic Sci.* 38(7):772-778. July 1981. In English with French summ. SFA 26(4)

[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

81-003042 Morrison, B. R. S. and D. E. Wells. THE FATE OF FENITROTHION IN A STREAM ENVIRONMENT AND ITS EFFECT ON THE FAUNA, FOLLOWING AERIAL SPRAYING OF A SCOTTISH FOREST. *Sci. Total Environ.* 19(3):233-252. July 1981. SFA 26(4)

[Dep. Agric. Fish. Scotland, Pitlockry, Perthshire, Scotland]

81-003043 Musial, C. J.; J. F. Uthe; G. R. Sirota; B. G. Burns; M. W. Gilgan; V. Zitko and R. A. Matheson. DI-*n*-HEXYL PHTHALATE (DHP), A NEWLY IDENTIFIED CONTAMINANT IN ATLANTIC HERRING (*CLUPEA HARENGUS HARENGUS*) AND ATLANTIC MACKEREL (*SCOMBER SCOMBRUS*). *Can. J. Fish Aquatic Sci.* 38(7):856-859. July 1981. In English with French summ. SFA 26(4)

[Dep. Fish. Oceans, Halifax Lab., Halifax, NS B3J 2S7, Canada]

81-003044 Osborne, L. L.; D. R. Iredale; F. J. Wrona and R. W. Davies. EFFECTS OF CHLORINATED SEWAGE EFFLUENTS ON FISH IN THE SHEEP RIVER, ALBERTA. *Trans. Am. Fish. Soc.* 110(4):536-540. July 1981. SFA 26(4)

[Dep. Biol., Univ. Calgary, Calgary, AB T2N 1N4, Canada]

81-003045 Parlour, J. W. THE POLITICS OF WATER POLLUTION CONTROL: A CASE STUDY OF THE CANADIAN FISHERIES ACT AMENDMENTS AND THE PULP AND PAPER EFFLUENT REGULATIONS, 1970. *J. Environ. Manage.* 13(2):127-149. Sept. 1981. SFA 26(4)

[King Alfred's Coll., Winchester, Hampshire, England]

81-003046 Roline, R. A. and J. R. Boehmke. EFFECTS OF HEAVY METALS POLLUTION OF THE UPPER ARKANSAS RIVER ON THE DISTRIBUTION OF AQUATIC MACROFAUNA. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:60. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. Abstract only. SFA 26(4)

[WPRS-D1522, P.O. Box 25007, DFC, Denver, CO 80225]

81-003047 Rope, S. K. and F. W. Whicker. RADIUM ACCUMULATION IN TROUT RAISED IN URANIUM MINE SETTLING PONDS. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:32-35. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. SFA 26(4)

The purpose of this study was to assess the feasibility of a proposed recreational lake at the site of Pathfinder Mines Shirley Basin Uranium Mine, based on potential radiation dose to man for consumption of radionuclides in fish. Radium-226 was assumed to be the critical nuclide. Results indicated that fish of the same species existing in water of similar origin can differ greatly in their accumulation of Ra 226. Radium concentrations in fish were positively correlated with fish age and negatively correlated with calcium

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81-003047 CONTINUED concentration of the water. Parts of the fish that were analyzed for Ra-226 were bone, flesh, skin, and fins. An average of 6% of the total radium was located in the flesh. The other 94% was distributed approximately equally between the bone fraction and the combined skin-fins fraction. Calculation of radiation dose to man from ingestion of fish under four consumption patterns indicated that, from the standpoint of Ra-226, a recreational lake at the Pathfinder site would be feasible.

81-003048 Sigler, J. W. EFFECTS OF CHRONIC TURBIDITY ON FEEDING, GROWTH AND SOCIAL BEHAVIOR OF STEELHEAD TROUT AND COHO SALMON. *Ph.D. dissertation, Univ. Idaho* 169p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(3):896. Sept. 1981. SFA 26(4)

Fish reared in clear water were notably larger and increased more rapidly in both weight and length than fish reared in turbid water. Larger numbers of clear water reared fish remained in the channels at the end of the growth phases. A smaller percentage of the fish reared in clear water emigrated from the competition phase tests than did fish reared in turbid water, even in those cases where the size differential was not more than a few millimeters.-- From abstr.

81-003049 Skaar, D. R.; B. T. Johnson; J. R. Jones and J. N. Huckins. FATE OF KEPONE AND MIREX IN A MODEL AQUATIC ENVIRONMENT: SEDIMENT, FISH, AND DIET. *Can. J. Fish. Aquatic Sci.* 38(8):931-938. Aug. 1981. In English with French summ. SFA 26(4)

[Dep. Biol., Mont. State Univ., Bozeman 59717]

81-003050 Skea, J. C.; H. J. Simonin, S. Jackling and J. Symula. ACCUMULATION AND RETENTION OF MIREX BY BROOK TROUT FED A CONTAMINATED DIET. *Bull. Environ. Contam. Toxicol.* 27(1):79-83. July 1981. SFA 26(4)

[N.Y. State Dep. Environ. Conserv., Bur. Environ. Conserv., Field Toxicant Res. Unit, Rome, NY 13440]

81-003051 Southworth, G. R.; C. C. Keffer and J. J. Beauchamp. THE ACCUMULATION AND DISPOSITION OF BENZ(A)ACRIDINE IN THE FATHEAD MINNOW, *PIMEPHALES PROMELAS*. *Arch. Environ. Contam. Toxicol.* 10(5):561-569. Sept. 1981. SFA 26(4)

[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]

81-003052 Stout, V. F.; C. R. Houle and F. L. Beezhold. A SURVEY OF CHLORINATED HYDROCARBON RESIDUES IN MENHADEN FISHERY PRODUCTS. *Mar. Fish. Rev.* 43(3):1-13. Mar. 1981. SFA 26(4)

[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

81-003053 Tisa, M. S. and R. J. Strange. ZINC AND CADMIUM RESIDUES IN STRIPED BASS FROM CHEROKEE, NORRIS, AND WATTS BAR RESERVOIRS. *J. Tenn. Acad. Sci.* 56(4):134-137. Oct. 1981. SFA 26(4)

[Dep. Wildl. Fish., VPI&SU, Blacksburg, VA 24061] Zinc and cadmium concentrations in muscle, liver, and kidney were measured in striped bass (*Morone saxatilis*) from Cherokee, Norris, and Watts Bar reservoirs in East Tennessee to determine if these metals had contributed to fish kills observed in Cherokee during the 1970's. The range of mean concentrations of zinc from collections of Cherokee striped bass (muscle 11-14, liver 98-106, kidney 88-105 mg zn/kg dry weight) were comparable to ranges in fish from Norris and Watts Bar (muscle 12-13, liver 83-132, kidney 96-108 mg/kg dry weight). With the exception of concentrations in the kidneys of one

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81-003053 CONTINUED collection, cadmium residues from Cherokee striped bass (muscle 0.02-0.09, liver 0.3-0.7, kidney 0.2-4.0 mg Cd/kg dry weight) were also similar to residues from Norris and Watts Bar fish (muscle 0.05-0.13, liver 0.3-2.1, kidney 0.3-0.5 mg Cd/kg dry weight). There were significant differences in tissue residues among seasons (summer 1979, spring 1980, summer 1980) in Cherokee Reservoir, as well as significant differences among the three reservoirs (Cherokee, Norris, Watts Bar) during the same season (spring 1980). All concentrations, however, were well below those reported for fish exposed to the maximum non-harmful concentrations of zinc and the lowest potentially harmful concentration of cadmium and moreover, were within the range typically reported for fish tissues. It is, therefore, believed that in at least the last two years, zinc and cadmium in the tissues of striped bass from Cherokee Reservoir have not been harmful to the fish.

81-003054 van den Broek, W. L. F.; D. M. Tracey; S. R. B. Solly and M. Avrahami. MERCURY LEVELS IN SOME NEW ZEALAND SEA FISHES. *N.Z. J. Mar. Freshwater Res.* 15(2):137-146. 1981. SFA 26(4)
[Fish. Res. Div., P.O. Box 19062, Wellington, New Zealand]

81-003055 Weber, D. D.; D. J. Maynard; W. D. Gronlund and V. Konchin. AVOIDANCE REACTIONS OF MIGRATING ADULT SALMON TO PETROLEUM HYDROCARBONS. *Can. J. Fish. Aquatic Sci.* 38(7):779-781. July 1981. In English with French summ. SFA 26(4)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

81-003056 Wiesenburg, D. A.; G. Bodennec and J. M. Brooks. VOLATILE LIQUID HYDROCARBONS AROUND A PRODUCTION PLATFORM IN THE NORTHWEST GULF OF MEXICO. *Bull. Environ. Contam. Toxicol.* 27(2):167-174. Aug. 1981. SFA 26(4)
[Dep. Oceanogr., Tex. A&M Univ., College Station 77843]

81-003057 Young, G. J. and R. D. Blevins. HEAVY METAL CONCENTRATIONS IN THE HOLSTON RIVER BASIN (TENNESSEE). *Arch. Environ. Contam. Toxicol.* 10(5):541-560. Sept. 1981. SFA 26(4)
[Dep. Chem., East Tenn. Univ., Kingsport Univ. Cent., University Blvd., Kingsport 37660]

TOXICOLOGY; BIOASSAYS

81-003058 Alexander, H. C.; J. A. Quick, Jr. and E. A. Bartlett. STATIC ACUTE TOXICITY OF SODIUM BROMIDE OF FATHEAD MINNOWS. *Bull. Environ. Contam. Toxicol.* 27(3):326-331. Sept. 1981. SFA 26(4)
[Environ. Sci. Res. Lab., Dow Chemical Co., Midland, MI 48640]

81-003059 Bennett, R. O. DIFFERENTIAL COPPER UPTAKE BETWEEN TWO SYMPATRIC SPECIES OF KILLIFISHES, *FUNDULUS HETEROCLITUS* AND *FUNDULUS MAJALIS*. M.S. thesis, Adelphi Univ. 95p. 1980. From Masters Abstr. 19(2):117. June 1981. SFA 26(4)

Copper uptake in relation to salinity, copper concentration, and life history stage (juveniles and adults) was studied in *Fundulus heteroclitus* (common killifish) and *Fundulus majalis* (striped killifish). Copper uptake was significantly different between species in relation to salinity and copper concentration. Significant differences between juveniles and adults within a species was also observed. Generally, tissue distribution of copper in adults followed the same pattern of uptake in relation to salinity as whole adults. Gross body lesions occurred in the adults of *F.*

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TOXICOLOGY; BIOASSAYS (CONTINUED)

81-003059 CONTINUED *heteroclitus* and *F. majalis* at both copper concentrations tested. These lesions were more pronounced in *F. majalis* than *F. heteroclitus* and had a higher incidence at high copper concentrations.

81-003060 Bishop, W. E. and A. W. McIntosh. ACUTE LETHALITY AND EFFECTS OF SUBLETHAL CADMIUM EXPOSURE ON VENTILATION FREQUENCY AND COUGH RATE OF BLUEGILL (*LEPOMIS MACROCHIRUS*). *Arch. Environ. Contam. Toxicol.* 10(5):519-530. Sept. 1981. SFA 26(4)

[Environ. Safety Dep., Proctor and Gamble Co., Ivorydale Tech. Cent., Cincinnati, OH 45217]

81-003061 Borgmann, U. DETERMINATION OF FREE METAL ION CONCENTRATIONS USING BIOASSAYS. *Can. J. Fish. Aquatic Sci.* 38(8):999-1002. Aug. 1981. In English with French summ. SFA 26(4)

[Great Lakes Biolimnol. Lab., Can. Cent. Inland Waters, Burlington, ON L7R 4A6, Canada]

81-003062 Devi, A. P.; D. M. R. Rato; K. S. Tilak and A. S. Murty. RELATIVE TOXICITY OF THE TECHNICAL GRADE MATERIAL, ISOMERS, AND FORMULATIONS OF ENDOSULFAN TO THE FISH *CHANNA PUNCTATA*. *Bull. Environ. Contam. Toxicol.* 27(2):239-243. Aug. 1981. SFA 26(4)

[A.S. Murty: Agric. Can., Univ. Sub Post Office, London, ON N6A 5B7, Canada]

81-003063 Dixon, D. G. and J. B. Sprague. ACCLIMATION TO COPPER BY RAINBOW TROUT (*SALMO GAIARDNERI*) - A MODIFYING FACTOR IN TOXICITY. *Can. J. Fish. Aquatic Sci.* 38(8):880-888. Aug. 1981. In English with French summ. SFA 26(4)

[Great Lakes Biolimnol. Lab., Can. Cent. Inland Waters, Burlington, ON L7R 4A6, Canada]

81-003064 Dokholyan, V. K.; G. S. Shleyfer; T. P. Akhmedova and A. K. Magomedov. THE INFLUENCE OF DISSOLVED PETROLEUM PRODUCTS ON THE ACTIVITY OF SOME SPECIES OF FISH OF THE CASPIAN SEA. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):128-133. 1980. SFA 26(4)

[Dagestan Dep., Caspian Fish. Res. Inst., Makhachkala, USSR]

81-003065 Dubale, M. S. and P. Shah. BIOCHEMICAL ALTERATIONS INDUCED BY CADMIUM IN THE LIVER OF *CHANNA PUNCTATUS*. *Environ. Res.* 26(1):110-118. Oct. 1981. SFA 26(4)

[Dep. Zool., Univ. Sch. Sci., Gujarat Univ., Ahmedabad-380 009, India]

81-003066 Folmar, L. C.; D. R. Craddock; J. W. Blackwell; G. Joyce and H. O. Hodgins. EFFECTS OF PETROLEUM EXPOSURE ON PREDATORY BEHAVIOR OF COHO SALMON (*ONCORHYNCHUS KISUTCH*). *Bull. Environ. Contam. Toxicol.* 27(4):458-462. Oct. 1981. SFA 26(4)

[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

81-003067 Gerhart, E. H.; R. J. Liukkonen; R. M. Carlson; G. N. Stokes; M. Lukasewycz and A. R. Oyler. HISTOLOGICAL EFFECTS AND BIOACCUMULATION POTENTIAL OF COAL PARTICULATE-BOUND PHENANTHRENE IN THE FATHEAD MINNOW *PIMEPHALES PROMELAS*. *Environ. Pollut. Ser. A Ecol. Biol.* 25(3):165-180. July 1981. SFA 26(4)

[Dep. Chem., Univ. Minn., Duluth 55812] Fathead minnows *Pimephales*

SPORT FISHERY ABSTRACTS

TOXICOLOGY; BIOASSAYS (CONTINUED)

81-003067 CONTINUED *promelas* were exposed to phenanthrene adsorbed to <125µm coal particles in a 14-day flow-through exposure to determine changes in histology and bioaccumulation. Based on light microscopic examination, coal particulates caused no obvious damage to external surfaces such as gills or skin and particulates were not observed to have accumulated in internal tissues. However, coal particles were readily ingested and this was followed by extensive mucous secretion by the gut mucosa. In addition, electron micrographs of the gut showed mucous globules in coal-exposed epithelium but no erosion of microvilli. Phenanthrene bioaccumulation was compared in fish exposed to dissolved aqueous phenanthrene and fish exposed to dissolved aqueous phenanthrene plus coal particulate-bound phenanthrene. Enhanced phenanthrene uptake was not measured in coal-exposed fish and bioconcentration factors were 1000-4000 during the 14-day exposure period. Elimination of coal from the gut and phenanthrene from the tissues was rapid; both were undetectable after a 24-h depuration period.

81-003068 Graham, M. S. and C. M. Wood. TOXICITY OF ENVIRONMENTAL ACID TO THE RAINBOW TROUT: INTERACTIONS OF WATER HARDNESS, ACID TYPE, AND EXERCISE. *Can. J. Zool.* 59(8):1518-1526. Aug. 1981. In English with French summ. SFA 26(4)
[Mar. Sci. Res. Lab., Memorial Univ. Newfoundland, St. John's, NF A1C 5S7, Canada]

81-003069 Gunkel, G. BIOACCUMULATION OF A HERBICIDE (ATRAZINE, S-TRIAZINE) IN THE WHITEFISH (*COREGONUS FERA* J.): UPTAKE AND DISTRIBUTION OF THE RESIDUE IN FISH. *Arch. Hydrobiol. Supplementb.* 59(2-3):252-287. 1981. In English with German summ. SFA 26(4)
[Tech. Univ. Berlin, Inst. Tech. Umwelt., Sekr. 15, Straße des 17 June 135, D-1000 Berlin 12, West Germany]

81-003070 Gunkel, G. EINE KONTINUIERLICHE DURCHFLUSSANLAGE FÜR FISCHE ZUR DURCHFÜHRUNG VON LANGZEIT-NAHRUNGSKETTENUNTERSUCHUNGEN. [A CONTINUOUS FLOW APPARATUS FOR FISH USED FOR STUDYING LONG-TERM BIOACCUMULATION.] *Arch. Hydrobiol. Supplementb.* 59(2-3):288-300. 1981. In German with English summ. SFA 26(4)
[Tech. Univ. Berlin, Inst. Tech. Umwelt., Sekr. 15, Straße des 17 June 135, D-1000 Berlin 12, West Germany]

81-003071 Gupta, A. K. and V. K. Rajbanshi. MEASUREMENT OF ACUTE TOXICITY OF COPPER TO THE FRESHWATER TELEOST, *MYSTUS BLEEKERI* (DAY) USING BIOASSAY, STATISTICAL AND HISTOPATHOLOGICAL METHODS. *Arch. Hydrobiol.* 91(4):427-434. 1981. SFA 26(4)
[Dep. Limnol. Fish., Univ. Udaipur, 313001, India]

81-003072 Hall, L. W., Jr.; D. T. Burton and L. B. Richardson. COMPARISON OF OZONE AND CHLORINE TOXICITY TO THE DEVELOPMENTAL STAGES OF STRIPED BASS, *MORONE SAXATILIS*. *Can. J. Fish. Aquatic Sci.* 38(7):752-757. July 1981. In English with French summ. SFA 26(4)
[Johns Hopkins Univ., Appl. Phys. Lab., Aquatic Ecol. Sect., Shady Side, MD 20867]

81-003073 Hall, L. W., Jr.; D. T. Burton and S. L. Margrey. ACCLIMATION TEMPERATURE: AN IMPORTANT FACTOR IN POWER PLANT CHLORINATION STUDIES WITH LARVAL WHITE PERCH, *MORONE AMERICANA*. *J. Toxicol. Environ. Health* 7(6):941-950. June 1981. SFA 26(4)
[Johns Hopkins Univ., Appl. Phys. Lab., Aquatic Ecol. Sect., Shady Side, MD 20867] Larval white perch were subjected to interacting power plant conditions of total residual chlorine (0.00-0.30 mg/l), elevated temperature (2, 6, and 10°C), and exposure time (0.08, 2.0, and 4.0 h) at acclimation temperatures of 15 and 23°C. Mortality observations were conducted up to 96h

TOXICOLOGY; BIOASSAYS (CONTINUED)

81-003073 CONTINUED after exposure. Acclimation temperature was a significant factor contributing to the effects of simulated power plant conditions during the low and high thermal conditions. larvae tested at 23°C generally showed greater mortality at all treatment levels than those tested at 15°C. Mortality of test organisms during a 4-h exposure at the higher acclimation temperature was greater than 85% at elevated temperatures greater than 6°C regardless of other treatment factors. Mortalities as low as 30% were observed at the lower acclimation temperature.

81-003074 Haya, K. and B. A. Waiwood. ACID pH AND CHORIONASE ACTIVITY OF ATLANTIC SALMON (*SALMO SALAR*) EGGS. *Bull. Environ. Contam. Toxicol.* 27(1):7-12. July 1981. SFA 26(4)

[Dep. Fish. Oceans, Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

81-003075 Hose, J. E.; J. B. Hannah; M. L. Landolt; B. S. Miller; S. P. Felton and W. T. Iwaoka. UPTAKE OF BENZO[a]PYRENE BY GONADAL TISSUE OF FLATFISH (FAMILY PLEURONECTIDAE) AND ITS EFFECTS ON SUBSEQUENT EGG DEVELOPMENT. *J. Toxicol. Environ. Health* 7(6):991-1000. June 1981. SFA 26(4)

[M. L. Landolt: Coll. Fish., WH-10, Univ. Wash., Seattle 98195] Accumulation of benzo[a]pyrene (BaP) by sexually mature flatfish gonad, its transfer to developing gametes, and its subsequent effects on developing embryos were studied. Thin-layer chromatography revealed both unmetabolized BaP and polar metabolites in the ovary, wolffian ducts, oocytes, and semen of English sole 24 h after ip injection with 200 μ Ci [^{3} H]BaP. Concentrations of BaP and its metabolites were 3-11 times higher in oocytes and semen than in gonadal tissue. Fertilized eggs from flathead sole that had been fed 4.0 mg BaP 5 h before spawning demonstrated a significantly lower ($p < 0.001$) hatching success (11.9%) than eggs from control fish (56.6%). Morphological abnormalities were found in only 1.6% of control embryos but in 5.6% of embryos from treated females.

81-003076 Johnson, R. D. GILL HISTOPATHOLOGY IN RAINBOW TROUT EXPOSED TO OIL SHALE RETORT WATER. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:57. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. Abstract only. SFA 26(4)

[1959 N. 9th St., Laramie, WY 82070] Newly hatched rainbow trout were exposed to a series of sublethal concentrations of Occidental-6 oil-shale retort water and effects of fry survival and growth were monitored for 60 days. At the termination of this standard early life-stage bioassay, the second right gill arch was removed from survivors and processed according to transmission electron microscopy protocols based on buffered aldehyde-osmium fixation and plastic embeddment. One- μ m-thick transverse oblique sections were cut and stained with azure-B and observed with a light microscope. Graded histopathological lesions in response to the serially increasing doses of retort water included increases in the number of chloride cells, mucous cells, and white blood cells in the secondary lamellae, enlargement of the secondary lamellae lymphatic space and an increase in the respiratory diffusion distance. The diffusion distance in fish exposed to 0.01% dilution of retort water was significantly ($\alpha = .05$) higher than the diffusion distance in control fish. The no-observable-effect concentration (NOEC) derived for fry growth in the early life-stage bioassay was 0.01% dilution while the NOEC from the histopathology data was 0.0025% dilution.

81-003077 Kanazawa, J. MEASUREMENT OF THE BIOCONCENTRATION FACTORS OF PESTICIDES BY FRESHWATER FISH AND THEIR CORRELATION WITH PHYSICOCHEMICAL PROPERTIES OR ACUTE TOXICITIES. *Pestic. Sci.* 12(4):417-424. Aug. 1981. SFA 26(4)

[Natl. Inst. Agric. Sci., 3-1, Kannondai, Yatabi Ibaraki, 305 Japan] The bioconcentration factors (BCF) for 15 pesticides by a freshwater fish

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TOXICOLOGY; BIOASSAYS (CONTINUED)

81-003077 CONTINUED (topmouth gudgeon) were measured under continuous flow conditions in water containing 5 to 20 $\mu\text{g litre}^{-1}$ of each pesticide at the equilibrium condition. A significant correlation was found between the BCF by the fish and the water solubility of the pesticide or its partition coefficient (PC) between octan-1-ol and water. Moreover, a significant correlation was also found between the BCF by topmouth gudgeon and the acute toxicities to carp, rainbow trout and water flea. It would therefore appear that the bioconcentration potential of a pesticide by a fish may be predicted from knowledge of its solubility or PC, and that the acute toxicity of a pesticide to a fish may be predicted from knowledge of the BCF.

81-003078 Laitinen, M.; M. Nieminen; P. Pasanen and E. Hietanen. TRICAINE (MS-222) INDUCED MODIFICATION ON THE METABOLISM OF FOREIGN COMPOUNDS IN THE LIVER AND DUODENAL MUCOSA OF THE SPLAKE (*SALVELINUS FONTINALIS* X *SALVELINUS NAMAYCUSH*). *Acta Pharmacol. Toxicol.* 49(2):92-97. Aug. 1981. SFA 26(4)
[Dep. Clin. Chem., Univ. Kuopio, Kuopio, Finland]

81-003079 Leatherland, J. F. and R. A. Sonstegard. EFFECT OF DIETARY MIREX AND PCBs ON CALCIUM AND MAGNESIUM METABOLISM IN RAINBOW TROUT, *SALMO GAIIRDNERI* AND COHO SALMON, *ONCORHYNCHUS KISUTCH*; A COMPARISON WITH GREAT LAKES COHO SALMON. *Comp. Biochem. Physiol. C Comp. Pharmacol.* 69(2):345-351. 1981. SFA 26(4)
[Dep. Zool., Coll. Biol. Sci., Univ. Guelph, Guelph, ON, Canada]

81-003080 Mac, M. J. and J. G. Seelye. POTENTIAL INFLUENCE OF ACETONE IN AQUATIC BIOASSAYS TESTING THE DYNAMICS AND EFFECTS OF PCBs. *Bull. Environ. Contam. Toxicol.* 27(3):359-367. Sept. 1981. SFA 26(4)
[U.S. FWS, Great Lakes Fish. Lab., Ann Arbor, MI 48105]

81-003081 Marking, L. L. and T. D. Bills. SENSITIVITY OF FOUR SPECIES OF CARP TO SELECTED FISH TOXICANTS. *N. Am. J. Fish. Manage.* 1(1):51-54. 1981. SFA 26(4)
[U.S. FWS, P.O. Box 818, La Crosse, WI 54601]

81-003082 Mattice, J. S.; S. C. Tsai and M. B. Burch. COMPARATIVE TOXICITY OF HYPOCHLOROUS ACID AND HYPOCHLORITE IONS TO MOSQUITOFISH. *Trans. Am. Fish. Soc.* 110(4):519-525. July 1981. SFA 26(4)
[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]

81-003083 McKague, A. B. SOME TOXIC CONSTITUENTS OF CHLORINATION-STAGE EFFLUENTS FROM BLEACHED KRAFT PULP MILLS. *Can. J. Fish. Aquatic Sci.* 38(7):739-743. July 1981. In English with French summ. SFA 26(4)
[B.C. Research, Vancouver, B.C. V6S 2L2, Canada]

81-003084 Mehrle, P. M.; F. L. Mayer and D. R. Buckler. KEPONE AND MIREX: EFFECTS ON BONE DEVELOPMENT AND SWIM BLADDER COMPOSITION IN FATHEAD MINNOWS. *Trans. Am. Fish. Soc.* 110(5):638-643. Sept. 1981. SFA 26(4)
[U.S. FWS, Columbia Natl. Fish. Res. Lab., Columbia, MO 65201]

81-003085 Melancon, M. J.; C. R. Elcombe; M. J. Vodicknik and J. J. Lech. INDUCTION OF CYTOCHROMES P450 AND MIXED-FUNCTION OXIDASE ACTIVITY BY POLYCHLORINATED BIPHENYLS AND β -NAPHTHOFLAVONE IN CARP (*CYPRINUS CARPIO*). *Comp. Biochem. Physiol. C Comp Pharmacol.* 69(2):219-226. 1981. SFA 26(4)
[J. J. Lech: Dep. Pharmacol. Toxicol., Med. Coll. Wis., Milwaukee 53226]

SPORT FISHERY ABSTRACTS

TOXICOLOGY; BIOASSAYS (CONTINUED)

81-003086 Michibata, H. EFFECT OF WATER HARDNESS ON THE TOXICITY OF CADMIUM TO THE EGG OF THE TELEOST *ORYZIAS LATIPES*. *Bull. Environ. Contam. Toxicol.* 27(2):187-192. Aug. 1981. SFA 26(4)
[Biol. Inst., Fac. Sci., Toyama Univ., Toyama 930, Japan]

81-003087 Muramoto, S. INFLUENCE OF COMPLEXANS (NTA, EDTA) ON THE TOXICITY OF ALUMIUM CHLORIDE AND SULFATE TO FISH AT HIGH CONCENTRATIONS. *Bull. Environ. Contam. Toxicol.* 27(2):221-225. Aug. 1981. SFA 26(4)
[Inst. Agric. Biol. Sci., Okayama Univ., 2-20-1 Chu-o, Kurashiki, 710 Japan]

81-003088 Muramoto, S. VARIATIONS OF SOME ELEMENTS IN CADMIUM-INDUCED, MALFORMED FISH. *Bull. Environ. Contam. Toxicol.* 27(2):193-200. Aug. 1981. SFA 26(4)
[Inst. Agric. Biol. Sci., Okayama Univ., 2-20-1 Chu-o, 710 Japan]

81-003089 Neville, C. M. THE EFFECTS OF ENVIRONMENTAL ACIDIFICATION ON RAINBOW TROUT. *Ph.D. dissertation, Univ. Toronto* 1980. From Diss. Abstr. Int. B Sci. Eng. 42(1):101. July 1981. SFA 26(4)

81-003090 O'Neil, J. G. EFFECTS OF INTRAPERITONEAL LEAD AND CADMIUM ON THE HUMORAL IMMUNE RESPONSE OF *SALMO TRUTTA*. *Bull. Environ. Contam. Toxicol.* 27(1):42-48. July 1981. SFA 26(4)
[Dep. Life Sci., Trent Polytech., Nottingham, England]

81-003091 Pärt, P. and O. Svanberg. UPTAKE OF CADMIUM IN PERFUSED RAINBOW TROUT (*SALMO GAIARDNERI*) GILLS. *Can. J. Fish. Aquatic Sci.* 38(8):917-924. Aug. 1981. In English with French summ. SFA 26(4)
[Inst. Zoophysiol., Univ. Uppsala, P.O. Box 560, S-751 22 Uppsala, Sweden]

81-003092 Parkhurst, B. R. TOXICITIES OF SOILD WASTES, WASTEWATERS AND PRODUCTS FROM SYNTHETIC FUEL PROCESSES TO AQUATIC ORGANISMS. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:60. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. Abstract only. SFA 26(4)
[1059 Granito, Laramie, WY 82070] The acute toxicities to several aquatic organisms of solid wastes, extracts, wastewaters, and the water-soluble fractions of liquid products from synthetic fuel processes were measured and then compared to those from other industrial wastes. Aqueous extracts from coal gasification and shale oil solid wastes exhibited low toxicities to *Daphnia magna* compared to extracts from coal-fired power plant wastes and several other industrial wastes. Untreated wastewaters from coal liquefaction, coal gasification, and shale oil processes were all toxic to *D. pulex*, fathead minnows, and carp embryos. Their toxicities were attributed to high concentrations of phenols and ammonia. Water extracts from coal- and shale-derived oils were higher in toxicity to *D. magna* than comparable petroleum products. Hydrotreatment was found to reduce the toxicities of both coal- and shale-derived oils.

81-003093 Rao, D. M. R.; A. P. Devi and A. S. Murty. TOXICITY AND METABOLISM OF ENDOSULFAN AND ITS EFFECT ON OXYGEN CONSUMPTION AND TOTAL NITROGEN EXCRETION OF THE FISH *MACROGNATHUS ACULEATUM*. *Pestic. Biochem. Physiol.* 15(3):282-287. June 1981. SFA 26(4)
[A. S. Murty: Agric. Can., Univ. Sub P.O., London, ON N6A 5B7, Canada]
Experiments were conducted with the freshwater fish *Macrognathus aculeatus* to study the toxicity and metabolism of endosulfan and the effect of the pesticide on the oxygen consumption and total nitrogen excretion. The 96-hr LC₅₀ value was 3.5 ± 0.2 ppb. In brain, gills, gut, liver,

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TOXICOLOGY; BIOASSAYS (CONTINUED)

81-003093 CONTINUED and kidney, endosulfan was metabolized to endosulfan sulfate, but this appears to be only an intermediary step as the nontoxic endosulfan ether was found only in the liver and kidney, the principal organs of elimination of toxicants in fish. The pesticide, both at sublethal and lethal concentrations, decreased oxygen consumption and total nitrogen excretion.

81-003094 Sangalang, G. B.; H. C. Freeman and R. Crowell. TESTICULAR ABNORMALITIES IN COD (*GADUS MORHUA*) FED AROCLOR 1254. *Arch. Environ. Contam. Toxicol.* 10(5):617-626. Sept. 1981. SFA 26(4)
[Dep. Fish. Oceans, Halifax, NS B3J 2S7, Canada]

81-003095 Schutzmann, R. L. THE ACUTE TOXICITY OF TITANIUM DIOXIDE PLANT EFFLUENT TO SHEEPSHEAD MINNOWS (*CYPRINODON VARIEGATUS*). *M.S. thesis, Univ. South. Miss.* 12p. 1980. From Masters Abstr. 19(2):128. June 1981. SFA 26(4)

A titanium dioxide plant, located on the Bay of St. Louis, Mississippi, is discharging waste effluent into the bay at an approved level of 5.75×10^3 mg/L. The effluent consists of: sodium chloride, sodium sulfate, titanium dioxide, ferrous chloride, vanadium oxytrichloride, chromium potassium sulfate, zinc chloride and cooling tower additives. LC_{50} acute toxicity tests were run on sheepshead minnows for a 96 hr. period. Results show that any discharge in excess of $2.0 \times$ the approved discharge level would result in appreciable kill.

81-003096 Seelye, J. G. and M. J. Mac. SIZE-SPECIFIC MORTALITY IN FRY OF LAKE TROUT (*SALVELINUS NAMAYCUSH*) FROM LAKE MICHIGAN. *Bull. Environ. Contam. Toxicol.* 27(3):376-379. Sept. 1981. SFA 26(4)
[U.S. FWS, Great Lakes Fish. Lab., Ann Arbor, MI 48105]

81-003097 Seguchi, K. and S. Asaka. INTAKE AND EXCRETION OF DIAZINON IN FRESHWATER FISHES. *Bull. Environ. Contam. Toxicol.* 27(2):244-249. Aug. 1981. SFA 26(4)

[Ageo Res. Lab., Agrochem. Div., Nippon Kayaku Co., Ltd., Ageo, Saitama 362, Japan]

81-003098 Seinen, W.; T. Helder; H. Vernij; A. Penninks and P. Leeuwangh. SHORT TERM TOXICITY OF TRI-N-BUTYLtinCHLORIDE IN RAINBOW TROUT (*SALMO GAIIRDNERI* RICHARDSON) YOLK SAC FRY. *Sci. Total Environ.* 19(2):155-156. June 1981. SFA 26(4)

[Fac. Vet. Sci., State Univ. Utrecht, Bilstraat 172, 3572 BP Utrecht, The Netherlands]

81-003099 Short, T. M. EFFECTS OF CHRONIC EXPOSURE TO SODIUM SELENITE OF SALTWATER BALANCE IN THE CRAYFISH. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:61. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. Abstract only. SFA 26(4)

81-003100 Singh, N. N. and A. K. Srivastava. EFFECT OF A PAIRED MIXTURE OF ALDRIN AND FORMOTHION ON CARBOHYDRATE METABOLISM IN A FISH, *HETEROPNEUSTES FOSSILIS*. *Pestic. Biochem. Physiol.* 15(3):257-261. June 1981. SFA 26(4)

[Dep. Zool., Univ. Gorakhpur 273001, Uttar Pradesh, India] Exposure of the Indian catfish (*Heteropneustes fossilis*) to a high sublethal concentration, 0.114 ppm (0.8 of the 96-hr LC_{50}) of a mixture of aldrin and formothion, added in a one-to-one ratio, for 3, 6, 12, 48, and 96 hr affected carbohydrate metabolism. Muscle glycogen decreased significantly

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81-003100 CONTINUED at 6 and 48 hr; hepatic glycogen content declined at 3, 6, 12, and 48 hr in exposed fish. Blood glucose levels in fish were significantly decreased at 3, 12, 48, and 96 hr. Mean value of blood pyruvate was significantly depressed at 3 hr. Blood lactate levels were elevated at 3, 6, 12, and 96 hr in pesticide-treated fish. The observed effects of the mixture of aldrin and formothion on carbohydrate metabolism in fish could prove useful as a rapid method for evaluating toxicity of pesticides and other toxicants.

81-003101 Smit, G. L. THE EFFECT OF TRICAINE METHANESULPHONATE AND GENERALLY USED ANTICOAGULANTS ON FISH HAEMATOLOGY. Ph.D. dissertation, Univ. Witwatersrand 1980. From Diss. Abstr. Int. B Sci. Eng. 42(1):90. July 1981. SFA 26(4)

81-003102 Suloway, J. J.; R. M. Schuller and R. A. Griffin. ACUTE TOXICITY OF LEACHATES FROM COAL GASIFICATION AND LIQUEFACTION SOLID WASTES TO THE FATHEAD MINNOW, *PIMEPHALES PROMELAS*. J. Environ. Sci. Health A Environ. Sci. Eng. (Marcel Dekker, Inc., N.Y.) 16(4):419-445. 1981. SFA 26(4)

[Ill. State Nat. Hist. Surv., Sect. Aquatic Biol., 607 East Peabody, Champaign 61820] Ninety-six hour static bioassays were conducted with one-to-six-day-old fathead minnow fry to determine the acute toxicity of leachates generated from Lurgi gasification ashes, an H-Coal liquefaction residue and an SRC-I liquefaction residue. LC-50 values, their 95% confidence intervals and the amount of dilution necessary to eliminate mortality during the 96-hour bioassays were determined. Leachates that were generated from the solid wastes at four pH levels and under anaerobic and aerobic conditions were analyzed for approximately 40 chemical constituents. Nineteen of the constituents were found to exceed recommended water quality criteria levels in some of the samples at pH values between 2.3 and 11.3. All eight leachates, including the unadjusted pH leachate, generated from the Lurgi ash of an Illinois No. 6 coal contained concentrations of Ca, F, Li, Mn, Pb, SO₄ and Sb which exceeded recommended water quality levels. Leachates produced from the gasification ashes were not acutely toxic at the unadjusted pH levels; however, unadjusted pH leachates from the liquefaction residues were acutely toxic. All leachates with a pH less than 6.2 were acutely toxic and required at least a 1:10 dilution and as much as a 1:2000 dilution to eliminate mortality. Mortality was probably caused by the combined effects of pH and total ionic strength of the leachates.

81-003103 Thurston, R. B.; G. R. Phillips; R. C. Russo and S. M. Hinkins. INCREASED TOXICITY OF AMMONIA TO RAINBOW TROUT (*SALMO GAIRDNERI*) RESULTING FROM REDUCED CONCENTRATIONS OF DISSOLVED OXYGEN. Can. J. Fish. Aquatic Sci. 38(8):983-988. Aug. 1981. In English with French summ. SFA 26(4)
[Fish. Bioassay Lab., Mont. State Univ., Bozeman 59717]

81-003104 Verma, S. R.; I. P. Tonk; A. K. Gupta and R. C. Dalela. ROLE OF ASCORBIC ACID IN THE TOXICITY OF PESTICIDES IN A FRESH WATER TELEOST. Water Air Soil Pollut. 16(1):107-114. July 1981. SFA 26(4)
[Pollut. Relevant Res. Lab., P.B. 264, Post-Grad. Dep. Zool., D.A.V. Coll., Muzaffarnagar - 251 001, India]

81-003105 Ward, G. S.; P. R. Parrish and R. A. Rigby. EARLY LIFE STAGE TOXICITY TESTS WITH A SALTWATER FISH: EFFECTS OF EIGHT CHEMICALS ON SURVIVAL, GROWTH, AND DEVELOPMENT OF SHEEPSHEAD MINNOWS (*CYPRINODON VARIEGATUS*). J. Toxicol. Environ. Health 8(1-2):225-240. July-Aug. 1981. SFA 26(4)
[EG&G Bionomics Mar. Res. Lab., 10307 Gulf Beach Highway, Pensacola, FL 32507] Flow-through, acute (96-h), and early life stage (28-d after hatch) toxicity tests were performed with eight chemicals on a saltwater fish, sheepshead minnows (*Cyprinodon variegatus*). Chemical effects on survival, growth, and development were determined. Maximum acceptable toxicant

SPORT FISHERY ABSTRACTS

TOXICOLOGY; BIOASSAYS (CONTINUED)

81-003105 CONTINUED concentrations (MATCs) were $>3.2 < 7.7$ mg/l for toluene, $>0.52 < 0.97$ mg/l for acenaphthene, $>80 < 156$ mg/l for isophorone, $>10 < 16$ mg/l for 4-nitrophenol, $>4.8 < 8.5$ mg/l for bromoform, $>0.39 < 0.79$ mg/l for 1-chloronaphthalene, $>0.09 < 0.18$ mg/l for 1,2,4,5-tetrachlorobenzene, and >0.36 mg/l for 2,4-dichloro-6-methylphenol; application factors were 0.25-0.59, 0.17-0.31, ≥ 0.57 , 0.31-0.50, ≥ 0.68 , ≥ 0.56 , 0.27-0.54, and < 0.10 , respectively. Test results reported here were compared with results of static, acute toxicity tests conducted previously with six species of aquatic organisms and the same chemicals.

81-003106 White, A.; T. C. Fletcher; M. B. Pepys and B. A. Baldo. THE EFFECT OF INFLAMMATORY AGENTS ON C-REACTIVE PROTEIN AND SERUM AMYLOID P-COMPONENT LEVELS IN PLAICE (*PLEURONECTES PLATESSA* L.) SERUM. *Comp. Biochem. Physiol. C Comp. Pharmacol.* 69(2):325-329. 1981. SFA 26(4)
[NERC Inst. Mar. Biochem., St. Fittick's Rd., Aberdeen AB1 3RA, Scotland]

RESEARCH AND MANAGEMENT-GENERAL

81-003107 Leedy, D. L.; T. M. Franklin and R. M. Maestro. PLANNING FOR URBAN FISHING AND WATERFRONT RECREATION. *U.S. Fish Wildl. Serv. FWS/OBS-80/35*. viii + 108p. July 1981. SFA 26(4)
[Urban Wildl. Res. Cent., Inc., 10921 Trotting Ridge Way, Columbia, MD 21044]

81-003108 Peterman, R. M. and G. J. Steer. RELATION BETWEEN SPORT-FISHING CATCHABILITY COEFFICIENTS AND SALMON ABUNDANCE. *Trans. Am. Fish. Soc.* 110(5):585-593. Sept. 1981. SFA 26(4)
[Dep. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6, Canada]

81-003109 UNESCO. FISHERY SCIENCE TEACHING AT THE UNIVERSITY LEVEL. *Unesco Rep. Mar. Sci.* 15. 75p. 1981. SFA 26(4)
[Rome, Italy]

81-003110 Von Geldern, C. BLACK BASS MANAGEMENT: A PROGRESS REPORT. *Outdoor Calif.* 42(5):4-8. Sept.-Oct. 1981. SFA 26(4)
[Calif. Dep. Fish Game, Rancho Cordova]

81-003111 Wright, S. CONTEMPORARY PACIFIC SALMON FISHERIES MANAGEMENT. *N. Am. J. Fish. Manage.* 1(1):29-40. 1981. SFA 26(4)
[Wash. Dep. Fish., Tumwater 98504]

ADMINISTRATION AND PLANNING

81-003112 Zuboy, J. R. A NEW TOOL FOR FISHERY MANAGERS: THE DELPHI TECHNIQUE. *N. Am. J. Fish. Manage.* 1(1):55-59. 1981. SFA 26(4)
[NMFS, 75 Virginia Beach Dr., Miami, FL 33149]

SPORT FISHERY ABSTRACTS

REPORTS OF FISHERY STATIONS, STATES, ETC.

81-003113 Foyle Fisheries Commission. THE FOYLE FISHERIES COMMISSION TWENTY-EIGHTH ANNUAL REPORT FOR 1979. *Foyle Fish. Comm. Annu. Rep.* 28:1-46. Mar. 1980. SFA 26(4)
[Belfast, Northern Ireland]

HABITAT ALTERATIONS

81-003114 Feller, M. C. EFFECTS OF CLEARCUTTING AND SLASHBURNING ON STREAM TEMPERATURE IN SOUTHWESTERN BRITISH COLUMBIA. *Water Resour. Bull.* 17(5):863-867. Oct. 1981. SFA 26(4)

[Fac. For., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada] A paired watershed study was conducted in western hemlock/western redcedar/Douglas fir forests of southwestern British Columbia to assess the effects of clearcutting and clearcutting plus slashburning treatments on stream water characteristics. In the case of stream temperatures, both treatments increased summer temperatures as well as summer daily temperature fluctuations. These effects lasted for seven years in the case of the clearcut stream but longer in the case of the clearcut and slash burned stream. Clearcutting increased winter stream temperatures whereas slashburning caused a decrease. These changes lasted less than four years. Clearcutting and slashburning had a greater impact on stream temperatures than did clearcutting alone.

81-003115 Griffith, J. S. and D. A. Andrews. EFFECTS OF A SMALL SUCTION DREDGE ON FISHES AND AQUATIC INVERTEBRATES IN IDAHO STREAMS. *N. Am. J. Fish. Manage.* 1(1):21-28. 1981. SFA 26(4)

[Dep. Biol., Idaho State Univ., Pocatello 83209]

81-003116 Gurtz, M. E. ECOLOGY OF STREAM INVERTEBRATES IN A FORESTED AND A COMMERCIALY CLEAR-CUT WATERSHED. *Ph.D. dissertation, Univ. Ga.* 181p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(2):488. Aug. 1981. SFA 26(4)

This study showed that species composition shifted in a direction conservative of the changing energy resources available to the stream ecosystem. Forest managers should choose appropriate sediment control measures for logging to have minimal impact on stream ecosystems.--From abstr.

81-003117 Keeton, J. A. FISHERY APPLICATIONS FOR LAKE BED AERATION SYSTEMS FOR WINTER AND SUMMER KILL PREVENTION. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:57. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. Abstract only. SFA 26(4)

[2809 Dean Dr., Fort Collins, CO 80521]

81-003118 La Bounty, J. F.; J. J. Sartoris; S. G. Campbell; J. R. Boehmke and R. A. Roline. STUDIES OF THE EFFECTS OF OPERATING THE MT. ELBERT PUMPED-STORAGE POWERPLANT ON TWIN LAKES, COLORADO: 1979 REPORT OF FINDINGS. *U.S. Dep. Interior Bur. Reclam. REC-ERC-80-7.* iv + 66p. Dec. 1980. SFA 26(4)

[Water Power Resour. Serv., Appl. Sci. Br., Div. Res., Eng. Res. Cent., Denver, CO]

81-003119 Messieh, S. N.; D. J. Wildish and R. H. Peterson. POSSIBLE IMPACT OF SEDIMENT FROM DREDGING AND SPOIL DISPOSAL ON THE MIRAMICHI BAY HERRING FISHERY. *Can. Tech. Rep. Fish. Aquat. Sci.* No. 1008. iv + 33p.

SPORT FISHERY ABSTRACTS

HABITAT ALTERATIONS (CONTINUED)

81-003119 CONTINUED Apr. 1981. In English with French summ. SFA 26(4)
 [Biol. Stn., St. Andrews, NB EOG 2X0, Canada] A field survey of the herring fishery in Miramichi Bay, N.B., Canada is presented, inclusive of catch statistics and fishing effort in the gillnet fishery. A spawning bed survey is described in relation to hydrographic conditions of the Bay. Data from plankton surveys designed to plot concentrations of larval fish in the Miramichi estuary are presented. Results of experiments with herring eggs and larval fish show that sediment deposited onto spawn will increase egg mortality. Suspended sediments resulting from dredge disposal could result in earlier hatching and shorter hatching lengths and could inhibit feeding of herring larvae at levels down to a few parts per million. Juvenile herring avoid suspended sediments in the parts per million range and thus dumping could result in low catches for individual gillnets near the dump site. Suggestions are presented to minimize the potential effects of dredging and dumping on the herring fishery in Miramichi Bay.

81-003120 Murphy, M. L.; C. P. Hawkins and N. H. Anderson. EFFECTS OF CANOPY MODIFICATION AND ACCUMULATED SEDIMENT ON STREAM COMMUNITIES. *Trans. Am. Fish. Soc.* 110(4):469-478. July 1981. SFA 26(4)
 [NMFS, Auk Bay Lab., Auk Bay, AK 99825]

81-003121 Nelson, K. L. and E. Weaver. CRITERIA FOR THE DESIGN AND EVALUATION OF STREAM EXCAVATION PROJECTS IN NORTH CAROLINA. *Fisheries (Bull. Am. Fish. Soc.)* 6(3):7-10. May-June 1981. SFA 26(4)
 [Rt. 4, Box 395, Fayetteville, NC 28304]

81-003122 Orth, D. J. and O. E. Maughan. ESTIMATED STREAM FLOW REQUIREMENTS FOR FISHES OF THE WASHITA RIVER BELOW FOSS RESERVOIR, WESTERN OKLAHOMA. *Water Resour. Bull.* 17(5):831-843. Oct. 1981. SFA 26(4)
 [Dep. Fish. Wildl. Sci., VPI & SU, Blacksburg, VA 24061] Velocity and depth preference curves for juvenile and adult red shiners (*Notropis lutrensis*) were developed for each season of the year. The incremental methodology, developed by the U.S. Fish and Wildlife Service for quantifying the amount of physical habitat available for fish, was applied as a basis for recommending minimum stream flows for life stages of red shiners and channel catfish (*Ictalurus punctatus*) in the Washita River below Foss Reservoir. The minimum stream flow required to support populations of red shiners and channel catfish was estimated to be 0.60 m³/s during all months except April and May, during which flushing flows of 3.0 m³/s were recommended. Under drought conditions a contingency flow of 0.18 m³/s was recommended for August through March, a flushing flow of 2.4 m³/s for April and May, and a flow of 0.30 m³/s for channel catfish spawning in June and July. Standing crop of adult red shiners per weighted usable area averaged 2.73 g/m² (27 kg/ha) for two sites on the Washita River. A positive relation between standing crop and weighted usable area was suggested. Use of the incremental methodology on the study reach below Foss Reservoir required 96 person-hours of labor, excluding training, travel, and developing preference curves, and a total cost of \$1,762, of which \$1,200 was for the purchase of equipment.

81-003123 Owen, J. B.; D. S. Elsen and G. W. Russell. DISTRIBUTION OF FISHES IN NORTH AND SOUTH DAKOTA BASINS AFFECTED BY THE GARRISON DIVERSION UNIT. *Univ. N. Dak. Fish Res. Unit* 1981. Available @ \$7.00 plus postage from Dep. Biol., Univ. N. Dak., Grand Forks 58202. SFA 26(4)

The distribution of fishes in the James River basin in North and South Dakota and the Wild Rice, Sheyenne and Souris River basins and Devils Lake closed basin in North Dakota was investigated in 1974 and 1975 by University of North Dakota biologists. The purpose of the study was to obtain current fish distribution records and to identify factors affecting distribution. In 1974 and 1975, 41 species of fish were collected in the James River basin with 60 species previously reported by earlier investigators. In 1974, 12 species of fish were collected in the Wild Rice River with 14 species now

SPORT FISHERY ABSTRACTS

HABITAT ALTERATIONS (CONTINUED)

81-003123 CONTINUED known in this river. In 1974, 32 species were collected in the Sheyenne River with 53 species previously recorded. In 1974, 18 species were collected in Souris River and 5 species were collected in the Devils Lake basin. The University of North Dakota collections showed (1) larger rivers supported many more species of fish than smaller rivers, and (2) downstream stretches of streams and rivers had more species than upstream stretches. Seasonal interruptions of flow, with resultant poor oxygenation, winter-kills, and summer-kills, are believed to be the principal limiting factors affecting distribution of fishes in the eastern Dakotas. More severe adverse conditions occurred in headwaters and smaller streams than in downstream stretches of rivers and larger streams. A large water development project, the Garrison Diversion Unit, is being planned in the above basins for irrigation, municipal and industrial, and fish and wildlife purposes. This project may affect fish distribution and enable fish species to be carried inadvertently from the Missouri River drainage to the Wild Rice, Sheyenne and Souris River basins which are in the Hudson Bay drainage. Although construction of the Garrison Diversion Unit will increase the risk of interbasin transfer of fish species the probability of interbasin transfer cannot be calculated accurately. Measures are being undertaken to prevent interbasin transfer and their effectiveness are being evaluated by other fishery workers.

81-003124 Stickney, R. R.; S. Wernsing; J. H. Williamson, B. D. Redner and R. B. McGeachin. RECOVERY OF BENTHIC INFAUNA ASSOCIATED WITH REWORKED INTERTIDAL DREDGE MATERIAL. *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 2:38-65. 1979(1980). SFA 26(4)

[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

HARVEST, CREEL CENSUS, ETC.

81-003125 FAO of the UN. 1979 YEARBOOK OF FISHERY STATISTICS. FISH COMMODITIES. *FAO Fish Ser.* 14. 49:xi + 178p. 1981. SFA 26(4)
[Rome, Italy]

81-003126 FAO of the UN. FISHERY COMMITTEE FOR THE EASTERN CENTRAL ATLANTIC (CECAF), REPORT OF THE FIRST SESSION OF THE WORKING PARTY ON FISHERY STATISTICS, DAKAR, SENEGAL, 13-14 OCTOBER 1980. *FAO Fish. Rep. No.* 245. viii + 141p. 1981. SFA 26(4)
[Rome, Italy]

81-003127 Greendale, R. and H. Powles. LA PÊCHE CÔTIÈRE AU HARENG EN GASPÉSIE, 1970-1978. [THE INSHORE FISHERY FOR HERRING IN GASPÉSIE.] *Can. Tech. Rep. Fish. Aquatic Sci.* No. 945. vii + 58p. Sept. 1980. In French with English summ. SFA 26(4)
[Dep. Fish. Oceans, Reg. Quebec, Quebec, PQ G1K 7Y7, Canada]

81-003128 Kreutzwiser, R. THE ECONOMIC SIGNIFICANCE OF THE LONG POINT MARSH, LAKE ERIE, AS A RECREATIONAL RESOURCE. *J. Great Lakes Res.* 7(2):105-110. 1981. SFA 26(4)

[Dep. Geogr., Univ. Guelph, Guelph, ON N1G 2W1, Canada] Recreation competes with agricultural, residential, and other uses of wetlands and decisions regarding wetland use invariably have been made in the absence of information on the economic significance of wetland recreation. During 1978, data to assess the economic significance of wetlands for recreation were obtained from 703 users of public marsh at Long Point and Point Pelee on the north

SPORT FISHERY ABSTRACTS

HARVEST, CREEL CENSUS, ETC. (CONTINUED)

81-003128 CONTINUED shore of Lake Erie. The Long Point marsh provided various recreational opportunities including nature viewing, fishing, and waterfowl hunting for over 17,000 users. It is estimated conservatively that these users placed a willingness to pay (consumer surplus) value on the recreation derived of over \$213,000 and generated directly and indirectly some \$225,000 in local spending on travel, food, accommodation, and other items. The Point Pelee experience demonstrates opportunities for enhancing the recreational and educational value of the Long Point marsh.

81-003129 Leaman, B. M.; D. Davenport; J. R. Selsby and D. C. H. Yao. BIOLOGICAL OBSERVER COVERAGE OF FOREIGN FISHERIES OFF CANADA'S PACIFIC COAST, 1979. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1006. iv + 64p. Mar. 1981. In English with French summ. SFA 26(4)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

81-003130 Panek, F. M. THE WARMWATER SPORT FISHERY OF EASTERN LAKE ONTARIO. *N.Y. Fish Game J.* 28(2):178-190. July 1981. SFA 26(4)

[N.Y. State Dep. Environ. Conserv., Watertown 13601] A creel census was carried on from June 17 to October 27 in 1978 in the New York waters of eastern Lake Ontario to determine the extent and distribution of fishing effort and harvest. A total of 1,676 counts of shore anglers and boats were recorded, and 372 anglers were interviewed. Fishing pressure was estimated as 274,073 angler hours (± 5 per cent) with 91 per cent of it being associated with the boat fishery and 55 per cent done on weekends and holidays. The estimated total harvest of 394,529 fish included 13 species, of which smallmouth bass, yellow perch and rock bass comprised 98 per cent. Catch rates for legal-sized smallmouth bass averaged 0.47 fish per hour in the boat fishery. Catch rates were similar to those of earlier studies indicating that the bass fishery in the eastern basin is both stable and of high quality.

81-003131 Reddin, D. G. and P. B. Short. THE 1976 NEWFOUNDLAND AND LABRADOR ATLANTIC SALMON COMMERCIAL LANDINGS. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1007. iv + 105p. Mar. 1981. In English with French summ. SFA 26(4)
[Dep. Fish. Oceans, P.O. Box 5667, St. John's, NF A1C 5X1, Canada]

81-003132 Stocker, S. ESTIMATION OF ANGLING PRESSURE AND HARVEST ON THE UPPER NORTH PLATTE RIVER: 1975-79. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:61. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. Abstract only. SFA 26(4)

[116 S. 6th, Laramie, WY 82070]

REGULATIONS

81-003133 Berkes, F. and D. Pocock. SELF-REGULATION OF COMMERCIAL FISHERIES OF THE OUTER LONG POINT BAY, LAKE ERIE. *J. Great Lakes Res.* 7(2):111-116. 1981. SFA 26(4)

[Inst. Urban Environ. Stud., Brock Univ., St. Catharines, ON L2S 3A1, Canada] We examined self-regulation among commercial fishermen of Outer Long Point Bay, and found evidence of it with respect to avoidance of crowding among gillnets, avoidance of gillnet-trawl conflicts, fishermen's attitudes toward smelt and perch quotas, fish size limits, and gillnet mesh size. Some of these are primary fishermen-controlled, and many are industry-controlled, for example, through the processors. While the fishermen and the fishing industry have some ability to self-regulate, fishermen may not be able to manage fisheries successfully because of conflicts among themselves and

REGULATIONS (CONTINUED)

81-003133 CONTINUED factors external to their control. Given the scope of management issues discussed in this paper, it is clear that self-regulation alone cannot meet the need for resource protection. Rather, we are suggesting that fishery regulations be designed to take account of existing self-regulation, and biological objectives for stock protection be reconciled with socio-economic objectives for the industry.

81-003134 Clark, R. D., Jr.; G. R. Alexander and H. Gowing. A HISTORY AND EVALUATION OF REGULATIONS FOR BROOK TROUT AND BROWN TROUT IN MICHIGAN STREAMS. *N. Am. J. Fish. Manage.* 1(1):1-14. 1981. SFA 26(4)
[Mich. Dep. Nat. Resour., Inst. Fish. Res., Ann Arbor 48109]

81-003135 Hunt, R. L. A SUCCESSFUL APPLICATION OF CATCH AND RELEASE REGULATIONS ON A WISCONSIN TROUT STREAM. *Wis. Dep. Nat. Resour. Tech. Bull.* No. 119. 30p. 1981. SFA 26(4)

[Rt. 1, Box 589, Waupaca, WI 54981] This study assessed the impact of restrictive angling regulations that emphasize release of most trout caught on a stocked brown trout (*Salmo trutta*) fishery. The catch and release fishery was judged to be highly successful. Angler use remained high in comparison to that during the 1976 baseline season; there was a 5% reduction in angler hours but angler trips/season increased by an average of 15%. Angler use during 1977 amounted to 1,015 hours/acre, the highest known value on a Wisconsin trout stream. Harvest was reduced by 99%, while the number of trout released increased by 116%. The 3-season average of trout released to trout creel was 268:1 as compared to a ratio of 2:1 in 1976. Some trout were probably released more than once per season since the catch of trout creel or released exceeded the number present in April. In response to the catch and release regulations, more anglers fished 10-20 times/season and the frequency of releasing more than 10 trout/trip increased. Distribution of angling effort over the course of the season was more even. The combined catch rates (trout creel or released) increased to atypically high values for Wisconsin--from 0.8/hour in 1976 to 1.08, 1.46, and 1.48 in 1977-79. Abundance, biomass, and survival rate characteristics of trout all changed favorably, based on average values for 1977-79 vs. 1976 data. The number of I+ trout increased in April by 58% (to 3,379/mile) and April biomass increased by 46% (to 164 lb/acre). The average number of I+ trout in October increased by 126% (to 1,889/mile) and their biomass increased by 50% (to 129 lb/acre). April to October survival of I+ trout averaged 56% during the special regulation seasons vs. 39% survival in 1976. Abundance of trout over 13 in. in early October (week after close of the fishing season) increased an average of only 12%. The successful catch and release fishery that evolved was not augmented by a much-improved "trophy trout" fishery. Lack of suitable habitat for such trout may have been the principal factor preventing a greater buildup. Removal of trout over 13 in. by anglers was not a limiting factor preventing a sustained accumulation in the population. The findings support continuation of the special regulations on the Race Branch as a highlight feature of trout management in that region and a modest expansion of catch and release regulations to other trout streams in Wisconsin to further diversify the variety of trout angling opportunities and strengthen the "management for quality" concept that is a basic component of present Department of Natural Resources trout management policy.

81-003136 Yundt, S. COMPARISON OF POPULATION AGE STRUCTURE AND MORTALITY OF BROWN TROUT UNDER DIFFERENT FISHING REGULATIONS ON TWO WYOMING STREAMS. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:49-55. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. SFA 26(4)

[Rt. 2, Box 25, Laramie, WY 82070] Population estimates using Petersen mark-and-recapture methods and electrofishing gear were made on the Laramie River (Woods Landing) and Little Laramie River (McGill Ranch) in 1979 and 1980, and on the Laramie River (Boswell Ranch) in 1979. Scales were collected, read and the population age structure determined. Mortality rates and population age structure of brown trout (*Salmo trutta*) in the Woods Landing and McGill Ranch Sections, under 10 fish bag limit (no terminal

SPORT FISHERY ABSTRACTS

REGULATIONS (CONTINUED)

81-003136 CONTINUED tackle restrictions), fishing regulations are compared with mortality rates and population age structure in the Boswell Ranch Section under 4 fish bag limit, flies only, terminal tackle, and 330mm maximum size limit fishing regulations. Mortality rates of brown trout in all sections was low (0-39%) for Age I and II trout. Mortality rates increased to 70-80% per year for Age II and older trout in the two sections under 10 trout bag limit restrictions. In the more restrictive section, mortality rates remained low (near zero) thru Age IV, increasing to over 90% per year in Age V brown trout. Results suggest limited fishing pressure can influence population age structure and mortality rates, and that fishing regulations can be helpful in improving the age structure of trout populations when properly applied.

MARKING AND TAGGING

81-003137 Gibbard, G. L. and R. L. Colura. RETENTION AND MOVEMENT OF MAGNETIC NOSE TAGS IN JUVENILE RED DRUM. *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 3:22-29. 1980(1981). SFA 26(4)
[Tex. Parks Wildl. Dep., P.O. Box 1146, Port Aransas 78373]

81-003138 Lee, D. S. and R. E. Ashton, Jr. USE OF ⁶⁰Co TAGS TO DETERMINE ACTIVITY PATTERNS OF FRESHWATER FISHES. *Copeia* 1981(3):709-711. 26 Aug. 1981. SFA 26(4)
[N.C. State Mus., P.O. Box 27647, Raleigh 27611]

81-003139 Osburn, H. R.; G. C. Matlock and H. E. Hegen. DESCRIPTION OF A MULTIPLE CENSUS TAGGING PROGRAM FOR MARINE FISHERIES MANAGEMENT. *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 2:9-25. 1979(1980). SFA 26(4)
[Tex. Parks Wildl. Dep., Rockport 78382]

81-003140 Welch, H. E. and K. H. Mills. MARKING FISH BY SCARRING SOFT FIN RAYS. *Can. J. Fish. Aquatic Sci.* 38(9):1168-1170. Sept. 1981. In English with French summ. SFA 26(4)
[Dep. Fish. Oceans, Freshwater Inst., 501 University Crescent, Winnipeg, MB R3T 2N6, Canada]

STOCKING AND INTRODUCTIONS

81-003141 Hebein, S. DIFFERENTIATION OF WILD AND HATCHERY CATCHABLE SIZE RAINBOW TROUT BY SCALE GROWTH PATTERNS AND BACK-CALCULATED LENGTH. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:1-4. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. SFA 26(4)
[P.O. Box 1203, Montrose, CO 81401] Differentiation of wild rainbow trout (*Salmo gairdneri*) from hatchery-reared catchable size rainbow trout by fish scale analysis was attempted. Regenerated scale counts were not statistically acceptable (r= 0.20) for separative purposes. Differentiation of scale sample origin based on observation of circuli growth patterns and definition of annuli was correct for 83% of the samples. Back-calculated length at first annulus was less than 12.5 cm for 91% of the wild rainbows sampled, while 56% of the hatchery fish sampled exceeded 12.5 cm at their first back-calculated annulus. Overall, origin was correctly determined for 92.4% of the fish sampled.

STOCKING AND INTRODUCTIONS (CONTINUED)

81-003142 Keller, W. T. and D. S. Plosila. COMPARISON OF DOMESTIC, HYBRID AND WILD STRAINS OF BROOK TROUT IN A POND FISHERY. *N.Y. Fish Game J.* 28(2):123-137. July 1981. SFA 26(4)

[N.Y. State Dep. Environ. Conserv., Stanford 12167] The survival and harvest of stocked fall fingerling brook trout of domestic, hybrid and wild strains were compared in a pond where the fishery was managed by regulations that permitted the use of worms as bait and allowed a daily creel of 10 trout of any size. The performance of the hybrid and wild strains was generally superior to that of the domestic strain. It was concluded that allowing the use of artificial lures only should decrease hooking mortality among sub-legal fish and provide an increased harvest of older and larger trout, as well as additional sport through the catch and release of sub-legal fish.

81-003143 Prince, E. D. and D. H. Barwick. LANDLOCKED BLUEBACK HERRING IN TWO SOUTH CAROLINA RESERVOIRS: REPRODUCTION AND SUITABILITY AS STOCKED PREY. *N. Am. J. Fish. Manage.* 1(1):41-45. 1981. SFA 26(4)

[NMFS, 75 Virginia Beach Dr., Miami, FL 33149]

81-003144 Shustov, Yu. A.; I. L. Shchurov and Yu. A. Smirnov. ADAPTATION TIMES OF HATCHERY SALMON, *SALMO SALAR*, TO RIVER CONDITIONS. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(4):156-159. 1980. SFA 26(4)

[Lab. Ecol. Fish Aquatic Invest., Inst. Biol., Karelian Dep., USSR Acad. Sci., Petrozavodsk, USSR]

81-003145 Umeda, K.; K. Matsumura; G. Okukawa; R. Sazawa; H. Honma; M. Arauchi; K. Kasahara and K. Nara. [ON THE COHO SALMON TRANSPLANTED FROM NORTH AMERICA INTO THE ICHANI RIVER.] *Sci. Rep. Hokkaido Salmon Hatchery* No. 35. p. 9-23. Mar. 1981. In Japanese with English summ. SFA 26(4)

[Hokkaido Salmon Hatchery, Nakanoshima, Toyohiraku, Sapporo, Hokkaido, Japan]

FISHING GEAR AND TECHNIQUES

81-003146 Green, A. W. and G. C. Matlock and J. E. Weaver. EFFECT OF FISH SIZE ON RECOVERY OF TAGGED FISHES IN AREAS TREATED WITH ROTENONE. *Annu. Proc. Tex. Chapter Am. Fish Soc.* 2:26-37. 1979(1980). SFA 26(4)

[Tex. Parks Wildl. Dep., 4200 Smith School Rd., Austin 78744] Three randomly selected shoreline areas (1.67 ha) in each of seven Texas bay systems were treated with rotenone (2.0 ppm) during 1 July 1978 - 30 September 1978. Each sample area was enclosed with a 2-m deep net (35-mm stretched mesh). Twenty-seven different groups of 7-41 tagged fish each, having mean total lengths ranging from 84 to 447 mm were released into the area prior to rotenoning to obtain recovery rates. Each group of tagged fish was assigned to a species group and assigned an expected recovery value based on previous experience. Recovery rates were regressed on mean length, mean length squared, mean length cubed and expected recovery value. A significant regression ($R^2 = 0.778$; $P > 0.001$) of the form $Y = 134.5502 + 0.6180X_1 - (2.1-28X_1^{-6})X_1^2 + 1.2597X_2$ was found, where Y was the recovery rate, X_1 was the mean length and X_2 was the expected recovery value. The expected recovery value explained only 9% of the observed variation whereas mean length explained 69%, indicating that the estimation of recovery rates for different sizes of fish is more important than estimating recovery rates for different species or species group.

81-003147 Kushlan, J. A. SAMPLING CHARACTERISTICS OF ENCLOSURE FISH TRAPS. *Trans. Am. Fish. Soc.* 110(4):557-562. July 1981. SFA 26(4)

[Natl. Park Serv., South Fla. Res. Cent., P.O. Box 279, Homestead, FL 33030]

FISHING GEAR AND TECHNIQUES (CONTINUED)

81-003148 Main, J. and G. I. Sangster. A STUDY OF THE SAND CLOUDS PRODUCED BY TRAWL BOARDS AND THEIR POSSIBLE EFFECT ON FISH CAPTURE. *Scott. Fish. Res. Rep.* No. 20. 20p. 1981. SFA 26(4)
[Mar. Lab., Aberdeen, Scotland]

81-003149 Nashimoto, K.; S. Sasaki and T. Meguro. [MEASUREMENT OF TENSION OF LEADLINE DURING THE HAULING OF GILLNET ON BOAT.] *Bull. Jpn. Soc. Sci. Fish.* 47(4):469-474. Apr. 1981. In Japanese with English summ. SFA 26(4)
[Fac. Fish., Hokkaido Univ., Minato, Hakodate 041, Japan]

81-003150 Rainwater, W. C. PRESSURIZED ROTENONE DISPENSER. *Prog. Fish-Cult.* 43(3):160. July 1981. SFA 26(4)
[U.S. Fish Wildl. Serv., South Central Reservoir Invest., Fayetteville, AR 72701]

81-003151 Shimazaki, K.; S. Sasaki and S. Yamamoto. [ON THE SELECTIVITY OF GILLNET FOR POMFRET.] *Bull. Fac. Fish. Hokkaido Univ.* 32(1):52-60. Mar. 1981. In Japanese with English summ. SFA 26(4)
[Res. Inst. North Pac. Fish., Fac. Fish., Hokkaido Univ., Hokodate, Japan]

81-003152 Sinoda, M. COMPETITION FOR BAITED-HOOK IN A MULTIPLE SPECIES FISHERY. *Bull. Jpn. Soc. Sci. Fish.* 47(7):843-848. July 1981. SFA 26(4)
[Kyoto Inst. Oceanic Fish. Sci., Odashukuno, Miyazu, Kyoto 626, Japan]

81-003153 Trippel, E. A. and E. J. Crossman. COLLAPSIBLE FISH TRAP OF PLEXIGLASS AND NETTING. *Prog. Fish-Cult.* 43(3):157-158. July 1981. SFA 26(4)
[Dep. Zool., Univ. Toronto, Toronto, ON M5S 1A1, Canada]

81-003154 Yamane, T.; K. Nashimoto; K. Yamamoto and O. Sato. FIELD EXPERIMENTS TO TEST A METHOD OF MEASURING FISHING GEAR MOTION. *Bull. Fac. Fish. Hokkaido Univ.* 32(2):169-175. June 1981. SFA 26(4)
[Lab. Fishing Gear Technol., Fac. Agric., Kinki Univ., Japan]

FERTILIZATION OF SOIL AND WATER

81-003155 Blake, L. M. LIMING ACID PONDS IN NEW YORK. *N.Y. Fish Game J.* 28(2):208-214. July 1981. SFA 26(4)
[N.Y. State Dep. Environ. Conserv., Watertown 13601] The use of lime to neutralize acid conditions in ponds has been an accepted management tool in New York for some 20 years. This paper reviews various treatments, considering changes in pH, alkalinity and fish populations, and presents data on cost-benefit ratios. It is concluded that, for both accessible and remote ponds, liming is effective and economically feasible.

81-003156 Boyd, C. E. COMPARISON OF FIVE FERTILIZATION PROGRAMS FOR FISH PONDS. *Trans. Am. Fish. Soc.* 110(4):541-545. July 1981. SFA 26(4)
[Agric. Exp. Stn., Auburn Univ., Auburn, AL 36849]

81-003157 Davidson, R. G. and C. E. Boyd. PHYTOPLANKTON RESPONSE TO LIQUID FERTILIZERS. *Prog. Fish-Cult.* 43(3):126-129. July 1981. SFA 26(4)
[Agric. Exp. Stn., Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36849]

FERTILIZATION OF SOIL AND WATER (CONTINUED)

81-003158 Laflin, B. D. CHANGES IN THE FISHERY OF A FLOOD CONTROL RESERVOIR DURING FIVE YEARS OF FERTILIZATION. *Ky. Dep. Fish Wildl. Resour. Fish. Bull.* No. 66. 44p. July 1981. SFA 26(4)

[Rt., 8 Box 96, Glen Lily Rd., Bowling Green, KY 42101] Dewey Lake, an 1,100-acre flood control reservoir, was fertilized from 1967 through 1971 to increase the sport fish harvest. The fertilizer applied in 1967 was a water soluble inorganic fertilizer (20-20-5) applied five times throughout the summer at a rate of 40 pounds per acre. In 1968 through 1971, the fertilizer used was diammonium phosphate (21-53-0) that was applied five times per year at a rate of 17 pounds per acre. Cove-rotenone sampling was done from 1967 through 1971, and a non-uniform probability creel survey was conducted from 1968 through 1971. The standing crop of fishes increased during the fertilization period with the most beneficial increase to the fisherman being in the population of harvestable panfishes. The number of harvestable panfishes increased from ≤ 52 up to 227 fish per acre, or from ≤ 8.9 up to 35.0 pounds per acre. The population of channel catfish also increased within the survey period, as did the crappie population. The black bass population remained fairly constant, as did the number of shad, except during 1970. The total weight of shad during the fertilization period increased appreciably over the pre-fertilization period. The sport fish harvest during the 5-year fertilization period increased an average of 130% by numbers and 60% by weight over that recorded during the prefertilization period (1965 and 1966). Fishing pressure increased an average of 75%. The catch rate during the fertilization period varied from 0.98 to 1.25 fish per hour; whereas, the catch rate varied from 0.67 to 0.93 fish per hour during 1961 through 1966. The most pronounced changes in the sport fish harvest were the increased catches of panfishes and crappies. The catch of panfishes increased from 11,700 and 18,690 in 1965 and 1966 before fertilization, to a range of from 30,138 to 75,812 during fertilization. The harvest of crappies increased from 24,868 and 30,990 before fertilization, to a range of from 33,060 to 62,561 during fertilization. Except in 1971, the harvest of crappies during the fertilization period remained above 52,000 fish per year. The cost of the fertilizer was \$12,500 for 20-20-5 in 1967, \$7,470 for 21-53-0 in 1968, \$7,510 in 1969 and 1970, and \$7,724 in 1971, for a total cost of \$42,714 for the 5 years. This was an average cost per year of \$8,543. Based on the average cost per year and the average sport fishing pressure from 1959 through 1966 versus the average sport fishing pressure for 1968 through 1971, the cost per additional hour of fishing resulting during the fertilization period was approximately \$0.20 per hour. Based on the average catch for the pre-fertilization period versus the fertilization period, the average increased number of fish caught cost approximately \$0.13 per fish; however, based on additional pounds harvested, they cost approximately \$1.29 per pound. Because of the high cost of each additional pound produced, approximately \$1.29 per pound, and the greater weight increase to the creel on smaller lakes near the Dewey Lake area, it is recommended that the fertilization of Dewey Lake be terminated.

81-003159 Mills, K. H. THE RESPONSES OF A LAKE WHITEFISH (*COREGONUS CLUPEAFORMIS*) POPULATION TO WHOLE-LAKE FERTILIZATION. *Ph.D. dissertation, Univ. Manitoba* 1981. From *Diss. Abst. Int. B Sci. Eng.* 42(2):527. Aug. 1981. SFA 26(4)

FISHWAYS, FISH PASSAGE THROUGH DAMS, ETC.

81-003160 Foster, J. R. and T. J. Wheaton. LOSSES OF JUVENILE AND ADULT FISHES AT THE NANTICOKE THERMAL GENERATING STATION DUE TO ENTRAPMENT, IMPINGEMENT, AND ENTRAINMENT. *J. Great Lakes Res.* 7(2):162-170. 1981. SFA 26(4)

[Ontario Hydro. Res. Div., 800 Kipling Ave., Toronto, ON M8Z 5S4, Canada] From April 1976 to June 1977, juvenile and adult fish mortality at the Nanticoke Thermal Generating Station (TGS) was determined by examining the numbers, sizes, species, and health of fish entrapped by the western intake, impinged on the travelling screens, and entrained through the tempering

SPORT FISHERY ABSTRACTS

FISHWAYS, FISH PASSAGE THROUGH DAMS, ETC. (CONTINUED)

81-003160 CONTINUED pumps. These data indicate that the cooling water system of Nanticoke TGS entraps many valuable commercial and sport species, virtually all of which are subsequently killed. Mortality of entrapped fish was primarily due to entrainment through the tempering pumps, with only a small fraction due to impingement on the travelling screens. Mortality was highest among transient schooling species. The contribution of the eastern and western intakes to fish entrapment and mortality appeared to differ significantly.

81-003161 Tanner, B. J. and G. A. Wilde. COMPARISON OF FISH POPULATIONS ABOVE AND BELOW A CULVERT. *Blue Jay* 39(2):79-81. June 1981. SFA 26(4)
[For. Technol. Sch., P.O. Box 880, Hinton, AB T0E 1B0, Canada]

MATHEMATICS, STATISTICAL METHODS, AND MODELING

81-003162 Anderson, J. J. A STOCHASTIC MODEL FOR THE SIZE OF FISH SCHOOLS. *NOAA Fish. Bull.* 79(2):315-323. Apr. 1981. SFA 26(4)
[Fish. Res. Inst., Univ. Wash., Seattle 98195]

81-003163 Arnason, A. N. and K. H. Mills. BIAS AND LOSS OF PRECISION DUE TO TAG LOSS IN JOLLY-SEBER ESTIMATES FOR MARK-RECAPTURE EXPERIMENTS. *Can. J. Fish. Aquatic Sci.* 38(9):1077-1095. Sept. 1981. In English with French summ. SFA 26(4)
[Dep. Computer Sci., Univ. Manitoba, Winnipeg, MB R3T 2N2, Canada]

81-003164 de Klerk, P. and M. Gatto. SOME REMARKS ON PERIODIC HARVESTING OF A FISH POPULATION. *Math. Biosci.* 56(1-2):47-69. Sept. 1981. SFA 26(4)
[Univ. Amsterdam, The Netherlands] The paper treats the problem of determining when periodic exploitation strategies are worth implementing in the management of a fish resource. With reference to the well-known Beverton-Holt model (which is based on a constant-recruitment assumption), first a discrete-time version with age classes is derived. Then the possibility that periodic perturbations of the control can yield higher economic returns than those obtained at the optimal steady state is investigated. The technique adopted is a weak-variation analysis provided by the recently developed theory of periodic optimal control. It is shown that the performance index can be increased by a weak control perturbation whenever: (1) a significant economy of scale is present, (2) the older age classes are much more valuable than the younger ones. These results are proved to hold even if strong control variations (such as pulse fishing) are considered.

81-003165 Getz, W. M. and G. L. Swartzman. A PROBABILITY TRANSITION MATRIX MODEL FOR YIELD ESTIMATION IN FISHERIES WITH HIGHLY VARIABLE RECRUITMENT. *Can. J. Fish. Aquatic Sci.* 38(7):847-855. July 1981. In English with French summ. SFA 26(4)
[Dep. Entomol. Sci., Univ. Calif., Berkeley 94720]

81-003166 Grant, W. E.; K. G. Isakson and W. L. Griffin. A GENERAL BIOECONOMIC SIMULATION MODEL FOR ANNUAL-CROP MARINE FISHERIES. *Ecol. Model.* 13(3):195-219. Aug. 1981. SFA 26(4)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

81-003167 Grant, W. E.; K. G. Isakson and W. L. Griffin. A GENERAL BIOECONOMIC SIMULATION MODEL FOR ANNUAL-CROP MARINE FISHERIES. *Ecol. Model.* 13(3):195-219. Aug. 1981. SFA 26(4)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

SPORT FISHERY ABSTRACTS

MATHEMATICS, STATISTICAL METHODS, AND MODELING (CONTINUED)

81-003168 King, T. A.; J. C. Williams; W. D. Davies and W. L. Shelton. FIXED VERSUS RANDOM SAMPLING OF FISHES IN A LARGE RESERVOIR. *Trans. Am. Fish. Soc.* 110(4):563-568. July 1981. SFA 26(4)

[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36849]

81-003169 Lett, P. F. A COMPARATIVE STUDY OF RECRUITMENT MECHANISMS OF COD AND MACKEREL, THEIR INTERACTION, AND ITS IMPLICATION FOR DUAL STOCK ASSESSMENT. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 988. vi + 45p. Dec. 1980. In English with French summ. SFA 26(4)

[Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

81-003170 Liou, W.-M. AN AGE-SPECIFIC, DENSITY-DEPENDENT MODEL FOR RECRUITMENT IN MARINE-FISH STOCKS. *Ph.D. dissertation, Univ. Wash.* 190p. 1980. From Diss. Abstr. Int. B Sci. Eng. 42(2):527. Aug. 1981. SFA 26(4)

81-003171 Peterman, R. M. FORM OF RANDOM VARIATION IN SALMON SMOLT-TO-ADULT RELATIONS AND ITS INFLUENCE ON PRODUCTION ESTIMATES. *Can. J. Fish. Aquatic Sci.* 38(9):1113-1119. Sept. 1981. In English with French summ. SFA 26(4)

[Dep. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6, Canada]

81-003172 Raleigh, R. F. and C. Short. DEPLETION SAMPLING IN STREAM ECOSYSTEMS: ASSUMPTIONS AND TECHNIQUES. *Prog. Fish-Cult.* 43(3):115-120. July 1981. SFA 26(4)

[U.S. Fish Wildl. Serv., OBS, Fort Collins, CO 80526]

81-003173 Roff, D. A. ON ESTIMATING PARTIAL RECRUITMENT IN VIRTUAL POPULATION ANALYSIS. *Can. J. Fish. Aquatic Sci.* 38(8):1003-1005. Aug. 1981. In English with French summ. SFA 26(4)

[Dep. Biol., McGill Univ., 1205 Ave. Docteur Penfield, Montreal, PQ H3A 1B1, Canada]

81-003174 Shepherd, J. G. CAUTIOUS MANAGEMENT OF MARINE RESOURCES. *Math. Biosci.* 55(3/4):179-187. Aug. 1981. SFA 26(4)

[Minist. Agric. Fish. Food, Fish. Lab., Lowestoft, Suffolk, NR33 0HT, England] Two management strategies are examined to determine (a) the rates at which they permit recovery of depleted stocks, (b) the latitude they allow for errors of assessment. The strategies are: (i) exploitation at constant yield/biomass ratio, (ii) a more cautious alternative, in which the yield/biomass ratio is reduced proportionately as the biomass falls below a target level. Recovery rates and latitude for error are rather small for stocks having right-skewed yield curves under strategy (i), but strategy (ii) allows rapid recovery and a very substantial margin for error (especially in the estimation of production rates), even for these stocks. The cautious strategy proposed has significant advantages over other strategies and warrants consideration for practical applications.

81-003175 Shirakihara, K. and S. Tanaka. A PREDATOR-PREY MODEL FOR TWO-SPECIES POPULATIONS WITH NONLINEAR INTERACTIONS AND IMPLICATIONS FOR FISHERIES MANAGEMENT. *Bull. Jpn. Soc. Sci. Fish.* 47(4):487-493. Apr. 1981. SFA 26(4)

[Ocean Res. Inst., Univ. Tokyo, Nakano-ku, Tokyo 164, Japan]

SPORT FISHERY ABSTRACTS

MATHEMATICS, STATISTICAL METHODS, AND MODELING (CONTINUED)

81-003176 Taylor, M. W. A GENERALIZED INLAND FISHERY SIMULATOR FOR MANAGMENT BIOLOGISTS. *N. Am. J. Fish. Manage.* 1(1):60-72. 1981. SFA 26(4)
[Federal Land Bank, Ord, NE 69962]

LAKE MANAGEMENT AND RESEARCH

81-003177 Goedde, L. E. and D. W. Coble. EFFECTS OF ANGLING ON A PREVIOUSLY FISHED AND AN UNFISHED WARMWATER FISH COMMUNITY IN TWO WISCONSIN LAKES. *Trans. Am. Fish. Soc.* 110(5):594-603. Sept. 1981. SFA 26(4)
[Ohio Dep. Nat. Resour., 952 Lima Ave., Findlay 45840]

81-003178 Kathandaraman, V. and R. L. Evans. AN ASSESSMENT OF THE ECOLOGY OF FOX CHAIN OF LAKES AND THE APPLICABILITY OF IN-LAKE RESTORATION TECHNIQUES. *Trans. Ill. State Acad. Sci.* 73(4):52-63. 1980. SFA 26(4)
[Water Qual. Sect., Ill. State Water Serv., P.O. Box 717, Peoria 61601]

81-003179 Rieman, B. E. and C. M. Falter. EFFECTS OF THE ESTABLISHMENT OF *MYXIS RELICTA* ON THE MACROZOOPLANKTON OF A LARGE LAKE. *Trans. Am. Fish. Soc.* 110(5):613-620. Sept. 1981. SFA 26(4)
[Idaho Dep. Fish Game, Coeur d'Alene 83814]

81-003180 Taggart, C. T. and D. J. McQueen. HYPOLIMNETIC AERATION OF A SMALL EUTROPHIC KETTLE LAKE: PHYSICAL AND CHEMICAL CHANGES. *Arch. Hydrobiol.* 91(2):150-180. 1981. SFA 26(4)
[Dep. Biol., McGill Univ., Montreal, PQ H3A 1B1, Canada] Tory Lake, Ontario (1.23 ha, 10 m max. depth) received hypolimnetic aeration for two successive summers (May-October, 1978, 1979). The small portable aerator did not disturb stratification and raised oxygen concentrations (average 2.42 mg/l 1978, and 1.47 mg/l 1979) in the hypolimnion. During the summers of both years total Kjeldahl-N and $\text{NH}_3\text{-N}$ slowly increased in the hypolimnion. $\text{NO}_3\text{-N}$ concentrations remained low. In the fall NH_3 was nitrified to NO_3 which slowly decreased during the winter. Total hypolimnetic phosphorus increased during the summer but the total mass of P was lower in 1979 than 1978. Soluble Mn decreased as a result of aeration and may have been removed in phosphate complexes. In both summers the metalimnion was virtually anoxic by July, and remained so until fall turnover. H_2S increased in the metalimnion but was almost absent in the hypolimnion. We conclude that hypolimnetic aeration is a useful lake restoration technique. However, a method must be found to eliminate anoxic metalimnia which are potential barriers to lake biota.

81-003181 U.S. Fish and Wildlife Service. GREAT LAKES FISHERY LABORATORY, U.S. FISH AND WILDLIFE SERVICE, ANN ARBOR, MICHIGAN, PROGRESS IN FISHERY RESEARCH 1980. *U.S. Fish Wildl. Serv.* 77p. 1981. SFA 26(4)
[Great Lakes Fish. Lab., 1451 Green Rd., Ann Arbor, MI 48105]

RIVER AND STREAM MANAGEMENT AND RESEARCH

81-003182 Avery, E. L. and R. L. Hunt. POPULATION DYNAMICS OF WILD BROWN TROUT AND ASSOCIATED SPORT FISHERIES IN FOUR CENTRAL WISCONSIN STREAMS. *Wis. Dep. Nat. Resour. Tech. Rep.* No. 121. 26p. 1981. SFA 26(4)
[Rt. 1, Box 589, Waupaca, WI 54981] Wild brown trout (*Salmo trutta*) populations in four central Wisconsin streams were studied from fall 1975 through spring 1978. Population inventories were conducted each spring and

SPORT FISHERY ABSTRACTS

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

81-003182 CONTINUED fall. A partial creel census conducted throughout the 1976 and 1977 fishing seasons provided information on the associated sport fisheries on each stream. Average spring density and biomass of brown trout in the four streams was 2,016/mile and 96 lb/acre, respectively. In the fall, the average density and biomass increased to 3,485/mile and 130 lb/acre, respectively. Roughly 37% of the spring populations and 34% of the fall populations were legal fish, i.e., 6.0 in. or more in length. Age II and III trout made up 67% and 19%, respectively, of the legal-sized fish present in the spring, while age I and II trout comprised 67% and 24%, respectively, of the legal fish present in the fall. Mean sizes of age I, II, and III trout in the spring were 4.8 in., 7.9 in., and 10.1 in., respectively. In the fall, age 0, I, II, and III trout averaged 3.8 in., 7.0 in., 9.4 in., and 11.2 in., respectively. A mean of 398 hours/acre of fishing in 1976 resulted in an average harvest of 425 trout/mile weighing 52 lb/acre. In 1977, fishing pressure declined to an average of 376 hours/acre and the mean harvest was 320 trout/mile weighing 37 lb/acre. Age II brown trout dominated the harvest during both years. Exploitation rate was generally less than 20% of the spring populations but reached as high as 68% and 78% for ages II and III+ in individual streams. Angler harvest skewed the size and age structure in all four streams toward smaller and younger fish. Especially noticeable was the scarcity of trout larger than 10 in. or over 3 years of age when compared to the population structure in a similar but lightly fished reach of one of the study streams. Overall effects of current minimum length (6.0 in.) and bag limit restrictions (5/day in May; 10/day from June through September) on brown trout population structure and angling quality in central Wisconsin streams are discussed. With increases in fishing pressure projected for the near future, changes to a minimum length limit of 7 in. for brown trout and a season-long bag limit of 5 brown trout/day are recommended in the southern half of Wisconsin (south of U.S. Highway 10) to insure the stability of wild brown trout stocks and to maintain and possibly improve the quality of the sport fisheries.

81-003183 Brinson, M. M.; B. L. Swift; R. C. Plantico and J. S. Barclay. RIPARIAN ECOSYSTEMS: THEIR ECOLOGY AND STATUS. *U.S. Fish Wildl. Serv. FWS/OBS-81/17*. xvi + 155p. Aug. 1981. SFA 26(4)
[East. Energy Land Use Team, U.S. FWS, Kearneysville, WV 25430]

81-003184 Chapman, D. W. PRACTICAL FISHERIES ASSESSMENT IN A TROPICAL FLOODPLAIN. *Fisheries (Bull. Am. Fish. Soc.)* 6(3):2-6. May-June 1981. SFA 26(4)
[Box 1362, McCall, ID 83638]

81-003185 Engstrom-Heg, R. A PHILOSOPHY OF TROUT STREAM MANAGEMENT IN NEW YORK. *Fisheries (Bull. Am. Fish. Soc.)* 6(3):11-16. May-June 1981. SFA 26(4)
[Box 58, Delhi Stage, Oneonta, NY 13820]

81-003186 Kurtz, J. UPPER GREEN RIVER: YESTERDAY AND TOMORROW. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:4-8. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. SFA 26(4)
[P.O. Box 936, Pinedale, WY 82941] From 1975 through 1979 an extensive investigation was conducted on 52.9 miles of the Upper Green River, Sublette County, Wyoming. The primary objective was to evaluate the coaction between wild and domestic salmonid populations in the river, and to determine and evaluate the various factors which are influencing the life history of salmonids in the river. The four major factors affecting the trout population in the upper river are winter habitat, harvest, stocking density, and trout-whitefish-man interactions. Management recommendations include elimination or reduction of catchable plants, adjustment of stocking density of rainbow fingerlings, and a regulation to reduce trout harvest of 5.9 miles of river within the Bridger National Forest.

SPORT FISHERY ABSTRACTS

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

81-003187 Light, J. T. A STREAM HABITAT IMPROVEMENT PLAN FOR THE ST. VRAIN RIVER, BOULDER COUNTY, LYONS, COLORADO. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:58. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. Abstract only. SFA 26(4)

[801 Baseline Rd., Boulder, CO 80302] The purpose of this study was to create a stream habitat improvement plan for a section of the St. Vrain River. A one-mile study section was selected that extends from the eastern city limits of Lyons, Colorado to Colorado Highway 93. The stream substrate was characterized as being in excess of 90% riffle and the few pools present were of low quality. Fish population estimated indicated 100% brown trout averaging 89.1 g and 217 mm (8.75 inches). A lack of cover and heavy fishing pressure has resulted in an overexploited sport fish population. Habitat improvement coupled with a minimum stream flow and catch and release regulations could lead to a substantial improvement in the sport fishery. The final design includes an increase in the quantity and quality of pools and the concentration of existing water flows by means of a thalweg channel. Twelve large pools have been designed that would require the removal of 3,400 cubic yards of bottom material and create 91,250 ft³ of pool volume.

81-003188 McDowell, R. A. WILD TROUT MANAGEMENT CASE: THE UPPER NORTH PLATTE RIVER. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:16-24. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. SFA 26(4)

[Rt. 2, Box 25, Laramie, WY 82070] For 127 miles in southeastern Wyoming, the Upper North Platte River flows unimpeded from the Colorado-Wyoming state line north to its first impoundment, Seminole Reservoir. The upper 75 miles is rated as class I, blue-ribbon trout stream. Prior to 1979, this fishery was managed under the Wyoming Game and Fish Department's "Basic Yield Concept". Stocking of hatchery rainbow, under this concept, was used to supplement the natural rainbow and brown trout fishery. Based on information collected since 1975 on populations, reproduction and harvest, it was determined that the uppermost portion of the river was capable of sustaining the fishery without the aid of stocking. Therefore, beginning in 1979, approximately 55 miles of this blue-ribbon river was placed under the "Wild Trout Concept" and all stocking by the department of this section ceased. Population and harvest estimates before and after the change to wild trout demonstrate a rapid recovery of the natural trout populations. Hatchery rainbow stocked prior to 1979 became almost non-existent in the population by the fall of 1980. Future management for this section of river will be directed towards the protection and enhancement of wild trout and wild trout fishing. Objectives and goals for the fishery are now being prepared and harvest regulations will be proposed in accordance with those goals.

81-003189 Nelson, F. A. STATUS REPORT ON INSTREAM FLOW IMPLEMENTATION AND EVALUATION OF SELECTED METHODS: MONTANA. *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:59. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. Abstract only. SFA 26(4)

[213 Lindley Place, Bozeman, MT 59715]

81-003190 Olson, J. E.; E. A. Whippe and G. C. Horak. REACH FILE PHASE II REPORT: A STANDARDIZED METHOD FOR CLASSIFYING STATUS AND TYPE OF FISHERIES. *U.S. Fish Wildl. Serv. FWS/OBS-81/31*. vi + 56p. Sept. 1981. SFA 26(4)

[Environ. Control, Inc., 1520 East Mulberry, Fort Collins, CO 80524]

81-003191 Orth, D. J. EVALUATION OF A METHODOLOGY FOR RECOMMENDING INSTREAM FLOWS FOR FISHES. *Ph.D. dissertation, Okla. State Univ.* 189p. 1980. From Diss. Abstr. Int. B Sci. Eng. 42(1):102. July 1981. SFA 26(4)

SPORT FISHERY ABSTRACTS

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

81-003192 Wiley, B. AQUATIC HABITAT CLASSIFICATION--WHAT'S IT ALL ABOUT? *Proc. Colo.-Wyo. Chap. Am. Fish. Soc.* 16:45-48. 1981. Available @ \$6.00 (U.S. & Canada) or \$9.00 (foreign) from Mary McAfee, Colo. Div. Wildl., 711 Independent, Grand Junction, CO 81501. SFA 26(4)
[Rt. 2, Box 25, Laramie, WY 82070]

FARM POND AND SMALL IMPOUNDMENT MANAGEMENT AND RESEARCH

81-003193 Alcorn, S. R. FISHING QUALITY IN TWO URBAN FISHING LAKES, ST. LOUIS, MISSOURI. *N. Am. J. Fish. Manage.* 1(1):80-84. SFA 26(4)
[USGS, 1340 W. Sixth St., Los Angeles, CA 90017]

81-003194 Paxton, K. O.; R. E. Day and F. Stevenson. LIMNOLOGY AND FISH POPULATIONS OF FERGUSON RESERVOIR, OHIO 1971-1975. *Ohio Fish Wildl. Rep.* 8. 53p. July 1981. SFA 26(4)

[Ohio Div. Wildl., Fountain Square, Columbus 43224] Ferguson Reservoir, a 123-hectare upground reservoir in northwest Ohio, is a dimictic temperate lake of mesotrophic-eutrophic classification. It is characterized by an absence of aquatic macrophytes, high mean transparency (2.3m), and annual summer and autumn drawdowns of 2-4m. For upground reservoirs, it has a rapid water renewal rate (300 days) with associated high nutrient loading and basic productivity. Zooplankton and benthic invertebrate communities, comprising populations characteristic of mesotrophic-eutrophic status, were relatively stable from 1971-1975. Species of *Daphnia*, *Chydoras*, *Bosmina*, *Alona*, and *Leptodora* were the dominant cladocerans. Chironomid larvae were numerically 66% to 85% of the benthic macroinvertebrates sampled, with *Chironomus*, *Procladius*, and *Coelotanyus* the most abundant genera. Important fish species were walleye (*Stizostedion v. vitreum*), yellow perch (*Perca flavescens*), white bass (*Morone chrysops*), white crappie (*Pomoxis annularis*), and bluegill (*Lepomis macrochirus*); all but white crappies were associated with lithophil or phyto-lithophil reproductive guilds. Reproductive success was the primary determinant of changing fish community structure from 1971-1975. Low summer water levels and limited inundated vegetation apparently were responsible for poor reproductive success of phyto-lithophils such as yellow perch, and phytophils such as largemouth bass (*Micropterus salmoides*) and crappies. Population size and structure, maturation and reproduction, age-growth, and food habits were studied for most of the major fish species present. Invertebrates provided most of the diet for the majority of fish species, but forage availability was generally not limiting to growth. Growth rates of most fish were rapid at all ages, but growth of walleyes and large yellow perch was reduced by a shortage of forage fish, directly related to inconsistent reproductive success of most species. The absence of a predator-prey relationship between walleyes and yellow perch accounted partially for poor walleye growth.

81-003195 Tave, D.; A. S. McGinty; J. A. Chappell and R. O. Smitherman. RELATIVE HARVESTABILITY BY ANGLING OF BLUE CATFISH, CHANNEL CATFISH, AND THEIR RECIPROCAL HYBRIDS. *N. Am. J. Fish. Manage.* 1(1):73-76. 1981. SFA 26(4)
[Dep. Fish. Allied Aquacult., Ala. Agric. Exp. Stn., Auburn Univ., Auburn, AL 36849]

LARGE IMPOUNDMENT MANAGEMENT AND RESEARCH

81-003196 Cichra, C. E. and R. L. Noble. SUMMER DRAWDOWN AS A FISHERIES MANAGEMENT TOOL IN FLOODWATER RETARDING STRUCTURES. *Annu. Proc. Tex. Chapter Am. Fish. Soc.* 3:1-21. 1980 (1981). SFA 26(4)

SPORT FISHERY ABSTRACTS

LARGE IMPOUNDMENT MANAGEMENT AND RESEARCH (CONTINUED)

81-003196 CONTINUED

[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station] During summer, 1977, six flood prevention lakes in central Texas were drawn down for determination of effects on fish, waterfowl, and water quality. The lakes were drawn down to approximately 50 percent of normal surface area and studied over a 3-year period. In spite of drought conditions, planted and natural vegetation became established on the exposed lake bottoms. Following refilling, water clarity, alkalinity, and hardness generally increased. The 1977 year class of most fish species was reduced, but year classes for the years following refilling were typically large and fish condition improved. By early- to mid-1979, most fish populations were similar in abundance and size composition to their pre-drawdown conditions. Summer drawdown appeared to be of less value for fisheries managers than has been reported for fall drawdown in larger reservoirs. The effects of summer drawdown on waterfowl utilization were not evaluated because drought conditions caused low water levels to persist through the time of waterfowl migrations.

81-003197 Sport Fishing Institute. EVALUATION OF PLANNING FOR FISH AND WILDLIFE AT CORPS OF ENGINEERS RESERVOIRS, BEAVER RESERVOIR PROJECT, ARKANSAS. *U. S. Army Corps Eng.* ix + 146p. Sept. 1981. SFA 26(4)
[608 13th St., N.W., Washington, DC 20005]

ESTUARY MANAGEMENT AND RESEARCH

81-003198 Baird, D.; J. F. K. Marais and T. Wooldridge. THE INFLUENCE OF A MARINA CANAL SYSTEM ON THE ECOLOGY OF THE KROMME ESTUARY, ST. FRANCIS BAY. *S. Afr. J. Zool.* 16(1):21-34. 1981. In English with Afrikaans summ. SFA 26(4)

[Dep. Zool., Univ. Port Elizabeth, P.O. Box 1600, Port Elizabeth 6000, South Africa] The influence of the marina canals on the lower reaches and mouth area of the Kromme estuary was investigated. Surveys were conducted during 1978 and 1979 in the marina system as well as in the main estuary in the vicinity of the marina. Analyses and comparisons of the biotic communities in the marina and in the main estuary showed a very similar composition, but differences in density were observed for several of the species. The plankton and nekton samples in the estuary and in the marina showed the same seasonal trends in abundance. The abiotic characteristics of the marina canals were also investigated and special attention was given to water circulation in the system during a tidal cycle. These observations showed the water circulation throughout the entire system was good, indicating efficient flushing and tidal turnover. Temperature, salinity and dissolved O_2 values indicated well-mixed and saturated waters. It is concluded that the marina has, in effect, increased the habitat area for plankton, benthic macro-invertebrate fauna and fish and that it does not have an adverse effect on the ecology of the Kromme estuary.

81-003199 Cross, R. D. and D. L. Williams, (eds.). PROCEEDINGS OF THE NATIONAL SYMPOSIUM ON FRESHWATER INFLOW TO ESTUARIES. *U. S. Fish Wildl. Serv. FWS/OBS-81/04* (2 vol.). xiv + 525p. & x + 528p. Oct. 1981. Available from Natl. Coast. Ecosyst. Team, U.S. FWS, NASA - Slidell Computer Complex, Slidell, LA 70458. SFA 26(4)

81-003200 Unesco. COASTAL LAGOON RESEARCH, PRESENT AND FUTURE. *Unesco Tech. Pap. Mar. Sci.* 32. 97p. 1981. SFA 26(4)

[Div. Mar. Sci., Place de Fontenoy, 75700 Paris, France]

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81-003201 FAO of the UN. GENERAL FISHERIES COUNCIL FOR THE MEDITERRANEAN. EIFAC 15:1-93. 1980. SFA 26(4)
[Rome, Italy]

81-003202 FAO of the UN. WESTERN CENTRAL ATLANTIC FISHERY COMMISSION (WECAFC) REPORT OF THE SECOND JOINT MEETING OF THE WORKING PARTY ON ASSESSMENT OF FISH RESOURCES AND THE WORKING PARTY ON STOCK ASSESSMENT OF SHRIMP AND LOBSTER RESOURCES, MEXICO CITY, MEXICO, 26-29 NOVEMBER 1979. *FAO Fish. Rep.* No. 235. viii + 41p. 1981. SFA 26(4)
[Rome, Italy]

81-003203 FAO of the UN. REPORT ON THE TECHNICAL CONSULTATION ON STOCK ASSESSMENT IN THE ADRIATIC, GENERAL FISHERIES COUNCIL OF THE MEDITERRANEAN (GFCM), SPLIT, YUGOSLAVIA, 2-6 JUNE 1980. *FAO Fish. Rep.* No. 239. iii + 68p. 1980. SFA 26(4)
[Rome, Italy]

81-003204 FAO of the UN. REPORT ON THE TECHNICAL CONSULTATION ON STOCK ASSESSMENT IN THE BALEARIC AND GULF OF LIONS STATISTICAL DIVISIONS, GENERAL FISHERIES COUNCIL FOR THE MEDITERRANEAN (GFCM), PALMA DE MALLORCA, SPAIN, 1-5 OCTOBER 1979. *FAO Fish. Rep.* No. 227. iii + 151p. 1981. SFA 26(4)
[Rome, Italy]

81-003205 Holden, A. V. HISTORICAL REVIEW OF EIFAC ACTIVITIES. *EIFAC Occas. Pap.* No. 13. vii + 35p. 1981. SFA 26(4)
[Freshwater Fish. Lab., Faskally, Pitlochry, Perthshire, Scotland]

81-003206 International Council for the Exploration of the Sea. REPORTS OF THE ICES WORKING GROUP ON NORTH ATLANTIC SALMON, 1979 AND 1980. *Int. Council. Explor. Sea. Coop. Res. Rep.* 104. 46p. Mar. 1981. SFA 26(4)
[Palægade 2-4, DK-1261 Copenhagen K, Denmark]

81-003207 International Pacific Halibut Commission. ANNUAL REPORT 1980. *Int. Pac. Halibut Comm. Annu. Rep.* 1980. 49p. 1981. SFA 26(4)
[P.O. Box 5009, University Station, Seattle, WA 98105]

81-003208 Lynde, C. M. ECONOMIC FEASIBILITY OF DOMESTIC GROUND FISH HARVEST FROM WESTERN ALASKA WATERS: A COMPARISON OF VESSEL TYPES, FISHING STRATEGIES, AND PROCESSOR LOCATIONS. *NOAA Fish. Bull.* 79(2):303-314. Apr. 1981. SFA 26(4)
[Cent. Quantitative Sci. For. Fish. Wildl., Seattle, WA 98195]

81-003209 Yeh, S. Y. DYNAMICS OF THE DEMERSAL FISH RESOURCES IN THE SUNDA SHELF AREA OF THE SOUTH CHINA SEA. *Ph.D. dissertation, Univ. Wash.* 240p. 1981. From Diss. Abstr. Int. B Sci. Eng. 42(4):3101. Oct. 1981. SFA 26(4)

UTILIZATION OF FISHERY PRODUCTS

81-003210 Tsepkin, Ye. A. A CONTRIBUTION TO THE HISTORY OF THE COMMERCIAL FISH FAUNA AND FISHERY IN THE MIDDLE REACHES OF THE ANGARA. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 20(3):131-134. 1980. SFA 26(4)

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UTILIZATION OF FISHERY PRODUCTS (CONTINUED)

81-003210 CONTINUED

[Dep. Ichthyol., Moscow Univ., USSR]

MISC. TECHNIQUES AND EQUIPMENT

81-003211 Christensen, M. S. and R. Winterbottom. A CORRECTION FACTOR FOR, AND ITS APPLICATION TO, VISUAL CENSUSES OF LITTORAL FISH. *S. Afr. J. Zool.* 16(2):73-79. 1981. SFA 26(4)

[Kenya Pisci-Culture Ltd., Nairobi, Kenya] Visual estimation techniques were used between October 1976 and May 1977 on the fish fauna of an enclosed mid-intertidal pool in the eastern Cape, South Africa, to test the usefulness and accuracy of this non-consumptive census method. In January, 1977, two pools were censused for fish, then poisoned using the ichthyocide 'pronoxfish' and all fish collected. Forty species in 21 families were obtained from the two stations. The accuracy of visual estimates varied with the species of fish. Secretive and cryptically coloured types, as well as species which inhabit crevices, were underestimated, between 0 and 86% being counted. Other fish with protective colours but that occur more openly and do not react adversely to divers, as well as schooling species, were also underestimated, but up to 100% of the total were observed. Those which occur singly or in small groups in the water column were counted more accurately, with 57 to 100% of the actual number being seen. Correction factors were calculated from these data and applied to a census taken of one pool in May. Comparisons of corrected and actual numbers indicate that these factors were relatively accurate for non-secretive species. The factors will, however, vary for each species, from observer to observer, depending on their personal experience, and from area to area.

81-003212 Heming, T. A. and R. P. Preston. DIFFERENTIAL EFFECT OF FORMALIN PRESERVATION ON YOLK AND TISSUE OF YOUNG CHINOOK SALMON (*ONCORHYNCHUS TSHAWYTSCHA* WALBAUM). *Can. J. Zool.* 59(8):1609-1611. Aug. 1981. In English with French summ. SFA 26(4)

[Dep. Zool., Univ. British Columbia, Vancouver, BC V6T 2A9, Canada]

81-003213 Kimura, D. K. and N. A. Lemberg. VARIABILITY OF LINE INTERCEPT DENSITY ESTIMATES (A SIMULATION STUDY OF THE VARIANCE OF HYDROACOUSTIC BIOMASS ESTIMATES). *Can. J. Fish. Aquatic Sci.* 38(9):1141-1152. Sept. 1981. In English with French summ. SFA 26(4)

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81-003214 Lapi, L. A. and T. J. Mulligan. SALMON STOCK IDENTIFICATION USING A MICROANALYTIC TECHNIQUE TO MEASURE ELEMENTS PRESENT IN THE FRESHWATER GROWTH REGION OF SCALES. *Can. J. Fish. Aquatic Sci.* 38(7):744-751. July 1981. In English with French summ. SFA 26(4)

[Dep. Fish. Oceans, Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

81-003215 Love, R. H. A MODEL FOR ESTIMATING DISTRIBUTIONS OF FISH SCHOOL TARGET STRENGTHS. *Deep-Sea Res. A Oceanogr. Res. Pap.* 28(7):705-725. July 1981. SFA 26(4)

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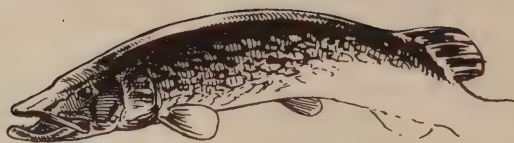
81-003216 Rainwater, W. C. FIBERGLASS TABLES FOR SORTING AND MEASURING FISH. *Prog. Fish-Cult.* 43(3):135. July 1981. SFA 26(4)

[U.S. Fish Wildl. Serv., South Central Reservoir Invest., Fayetteville, AR 72701]

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May 1981. SFA 26(4)



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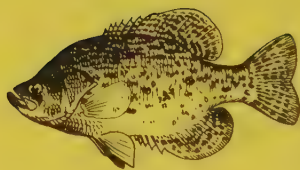
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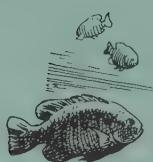
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Acta Agriculturae Scandinavica
 Acta Biotheoretica
 Acta Hydrochimica et Hydrobiologica
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